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Abstract

This thesis explores the opportunities for intervening as an architect in the context of community-led sanitation improvements in an informal settlement of Dar es Salaam, Tanzania. The inquiry is done through a practical experiment consisting in the implementation of a private to semi-private ecological sanitation facility, called “A Pilot toilet”. This implementation is made of different phases, methods and processes that are observed, monitored and reported in this work. Furthermore this performance is enhanced and supported by a contextual research on the issues and factors linked with the lack of improved sanitation in informal settlements in cities of the global south, but also by a framework outlined by wicked problems’ theory and the role of the architects/architecture in society.

Through this work, I am able to expose a way of doing architecture, through practice, that hopefully responds to the growing need for more holistic and also more participative or inclusive approaches to wicked problems such as the lack of sanitation in informal settlements.

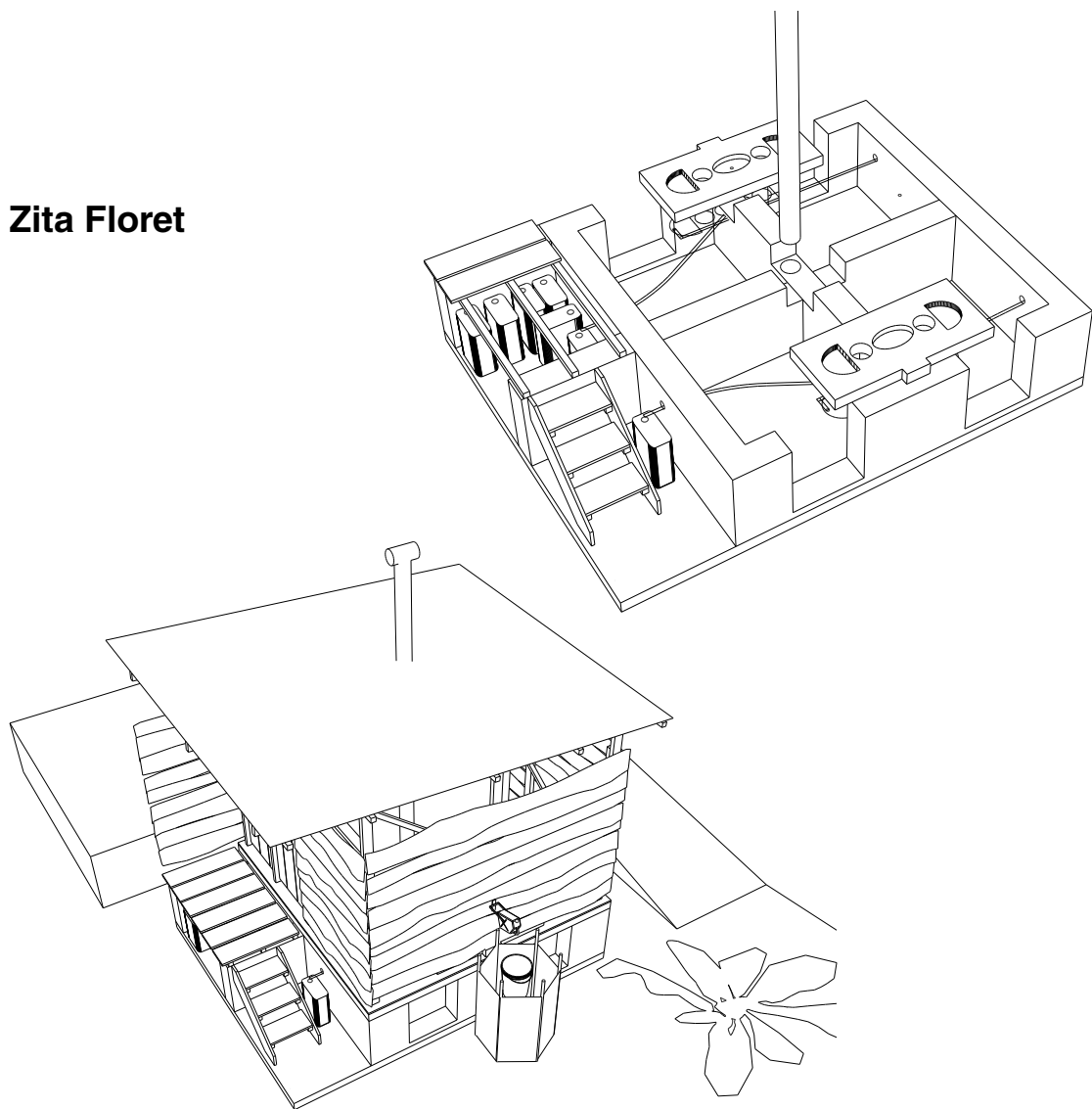
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Keywords participation in architecture, spatial agency, community-led sanitation improvement, ecological sanitation, informal settlements, wicked problems, performance architecture, holistic planning approach

ARCHITECTURE MEETS SANITATION

INTERVENING IN COMMUNITY-LED SANITATION IMPROVEMENTS
IN AN INFORMAL SETTLEMENT OF DAR ES SALAAM, TANZANIA

Zita Floret



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To my brother the explorer, my inspiration and mirror for so many years.

FOREWORD

Avant propos "destiné à être lu".

About two years ago, I was involved in two different courses at the same time - both proposed by Aalto University in Helsinki, Finland. One course called *A personal architecture* where we received small tasks, at first, to explore, write, build or draw on our personal experiences and approaches with and about architecture. And another course, called *City in transition*, where we were immersed in multidisciplinary groups working on complex issues with local urban poor communities in Sub-Saharan Africa. The particular setting, where a deep introverted act of thinking and subsequent acts of exchanging amongst students and teachers of the same field, was in great contrast with the explorations of a new culture, environment and consequently the experience of my own discipline through a completely new lens and context. The gap made evident, I asked myself, what kind of architecture do I want to practice and what do I want to work for. I had always been attracted by what lies beyond the built, what ideas shape our environment and what the effects of the built have on society, but also to questions of responsibility inherent to architectural practice.

In the *City in transition* course, the accent was put on the solving of complex problems through cooperation, working with other disciplines, dialogue and understanding, knowledge exchange between citizens and experts. These complex problems, expressions of deeper complex socio-political issues, tickled my interests just as much as a new approach to try to re-solve them and I wondered; How as an architect can I best

use my understanding of complex problems, include multiple perspectives, ideas and cultures to help shape our built environments? But most importantly, how do I not participate in creating a non-desired environment? I was changed by both experiences and ready for experimenting. The questions remained of how that would happen and with what means.

While the courses were still ongoing I engaged in the continuation of what had started during the *City in Transition* course, namely a multidisciplinary development project called "Sanitation improvement and social enterprise in Dar Es Salaam, Tanzania" (in collaboration with Global Dry Toilet Association of Finland and in partnership with the Centre for community Initiatives Tanzania, CCI, and a group from the Tanzanian Federation of the Urban Poor, PHAST Ujenzi), funded by a grant from the Finnish Ministry of Foreign Affairs, to which this thesis is happening in parallel to- and within.

Through the creation of an environmentally and socially sustainable community based sanitation enterprise using sustainable sanitation, the project's goal is to promote equal repartition of wealth and to stimulate social wellbeing by ensuring universal access to improved sanitation and water services. It aims at finding creative ways to extend and expand improved sustainable sanitation facilities and practices together with PHAST Ujenzi, through education, participatory design and planning, skill trainings, capacity building, cooperation and constant discussion throughout a three year project that as a result should also help them in the process of making their city more inclusive. On the field I am working closely with PHAST Ujenzi (group from the Federation of the Urban Poor), an environmental engineer from CCI and a local architect. I started focusing on

all construction related topics to find a way to reduce the costs of the toilet facilities built in their area but also find a more functional and sustainable model through understanding local conditions, climate, culture, beliefs, behaviours and habits.

Accordingly, this master's thesis represents an attempt to answer these existential questions within this specific context.

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"The truth of a city, is in its people: in the absence of a more intimate connection I at least had to see them." (de Beauvoir 1958).

INTRO

1. 1. A STORY OF SHIT...

Let's talk about shit. In the Chinese and Korean alphabet the signs for shit actually mean something positive and good unlike the meaning it has in most European languages like the English, "shit!", French, "merde!", German, "Scheiße!" and Finnish "paska!", which is rather negative, and expresses one and the same, disappointment, unwelcome news, a negative exclamation... Where does this difference come from? Did the word shit and its ascendants and cousins always mean something negative? Why on the contrary does shit have such a positive meaning in China and Korea? Why do people in Korea thank you when you fill their toilets with your human manure? I came to think that the answer might lie somewhere in the link between shit and food. For centuries in China and Japan farmers have used compost enhanced with the faeces of animals and humans, maybe therefore they still today consider shit as a present rather than a waste or something they want to separate themselves from. What about African cultures??? What signification does shit have in Africa countries? What kind of agriculture has been mainly practiced before modern western chemical agriculture? Did human or animal manure play any role in this agriculture? Our relation to shit is highly linked to the way we cultivate our land for food production. Our relation to shit is the same as our relation to agriculture. Not long ago a story was brought to me by my friend Desmond Ngochi, who is from Cameroon. As I can't transcribe the whole story I will simply tell about the main components of that story. It is about some of the poorest of the poor in Africa. So poor that they can't even dig a hole in the ground every now and then to hide their excreta. Kids would run around and shit in the open, the dogs would eat their shit. The adults would wait till the night, go to where the pigs are and shit; the pigs would eat their shit. Most ecological you might say! I mean direct redistribution of faecal matter to further processing without a need for storage or transport. But the fine line of that story is that the adults, ashamed would wait until the night to shit and probably be very happy that their shit immediately disappeared.

I have heard many times now, since working on sanitation in Tanzania that most of the time shit is problematic, people do not want to have anything to do with it. There is this famous example of the "flying toilets" in the Kibera slum of Nairobi, which for me is sort of a symbol, that not only tells about people's ability to find solutions when in very precarious situations but also for the attitude chosen. When not having access to toilets, dwellers of the Kibera slum excrete in plastic bags they then swing and throw onto their neighbour's roofs. On sunny days the faces would dry up and mean no harm, but on rainy days they would run down the roofs and contaminate the streets, creeks and rivers and further on the same people that have thrown their bag onto the neighbour's roof.

The same distinction to a Chinese or Korean way of considering shit is true in most of the west-

ern countries using flush toilets. When using flush toilets there is an instant disconnection happening between your shit and you at the second you press the button. When using dry toilets the disconnection doesn't happen. Once you shit you know you have to add some dry matter for the smell and for the composting, and later on you have to empty your toilet. You don't just get rid of the shit! Composting toilets mean, shit, add, compost, use, eat. Flush toilets mean, shit, flush, forget, loose.

Excreting is like sex or food. It is universal, intrinsically part of us as creatures, a primary need, but also so diversified and its practices so very related to our cultures.

1. 2. INTRODUCTION

Across our world ways of excreting and dealing with excreta are as varied as there are societies, and people, and are more than often reflected in our cultures; in the way urine and faeces are perceived. Sanitation, the term that describes the ways of dealing with excreta, is synonymous of cleanliness and hygiene and describes hygienic means or practices that prevent human contact with excreta. This is the general accepted “rule” for sanitation, on which the elaboration of a variety of sanitation systems and technologies is based, whose main goals are to find ways to neutralise excreta through “treatment”, where the treatment in turn can have a variety of faces.

In the western world sanitation systems have been dominated by the flush toilet + sewage system. A system that relies on water and opts for “treatment” away from the production place allowed through the conveying of faecal matters and urine through water, although it has been known since the first flush toilets’ invention, that water and excreta are incompatible (Rockefeller 1996). In the “West”, sanitation coverage is about 95% (WHO/UNICEF 2014), whereas in the global south, the proportion is much lower, in some regions like India or most of the African countries less than 50% of the population has access to improved sanitation facilities (fig. 1) (WHO/UNICEF 2014). The global south is where most of today’s 2,5 billion people (WHO/UNICEF 2014) who are lacking access to improved sanitation live; relying on open defecation or unimproved sanitation facilities, meaning facilities that are neither clean nor safe. Most of the time lacking access to improved sanitation also means lack of other amenities as many of those people are living in informal settlements. In informal settlements and the coinciding lack of sanitation are not only creating bad health conditions. They are symptoms and expressions of large and complex, deep and intertwined sociopolitical, economical, historical, demographic and cultural issues that consequently have deeper and greater impacts on these populations than simply health impacts i.e. social, wellbeing, economical, systematic exclusion.

In Dar es Salaam with an urban context dominated by unplanned and rapid urbanisation, which has given birth to large uncontrolled and badly developed settlements, infrastructures and basic services such as sanitation are not readily available. There, 80% of the population does not have access to improved sanitation facilities and 70% lives in informal settlements. The situation is dramatic and state institutions have failed to deliver adequate responses to these issues. In reaction, groups of citizens, called “federation” groups (like PHAST Ujenzi, the group I work with) have gathered to address the lack of sanitation with their own means. They are supported by a local NGO, Centre for Community Initiatives (CCI), and are working every day to improve the sanitation situation of their settlement, Keko Machungwa.

As an architecture and Creative Sustainability program student at Aalto University in Finland, my aim for this thesis is to find what could be the opportunities for architects in intervening in the community-led sanitation improvement practices in the context of an informal settlement of Dar es Salaam by experimenting with a way of practicing architecture, that is still largely undefined but aware of complex contexts and multiple stakeholders and has clearly identified its social function and responsibility. This work intends to uncover what role could architects play in creating a more desirable and needed present and future.

This is done mainly through a practice-led inquiry, that consists in implementation and reflexion upon the implementation of “A Pilot toilet”, firstly as a frame for debate and discussion on the main question of this work: CAN EXPERIMENTAL ARCHITECTURAL INTERVENTIONS BRIDGE THE GAP BETWEEN ARCHITECTS (EXPERTS, PLANNERS), COMMUNITIES (CITIZENS), AND AUTHORITIES, FOR THE IMPROVEMENT OF THE BUILT ENVIRONMENT? Or in other words as Bryan Boyer summarised it in *Legible Practices*, a “lens to help visualise specific opportunities for change, providing a way to see plausible futures more clearly and debate their merits more effectively” (BOYER 2013).

WHEN INVOLVED IN RESOLVING WICKED PROBLEMS, LIKE THE LACK OF SANITATION IN INFORMAL SETTLEMENTS, WHAT COULD BE THE ROLE OF THE ARCHITECT?

WHAT ARE THE OPPORTUNITIES FOR ARCHITECTS/ARCHITECTURE IN COMMUNITY-LED SANITATION IMPROVEMENT PROJECTS?

1. 3. STRUCTURE

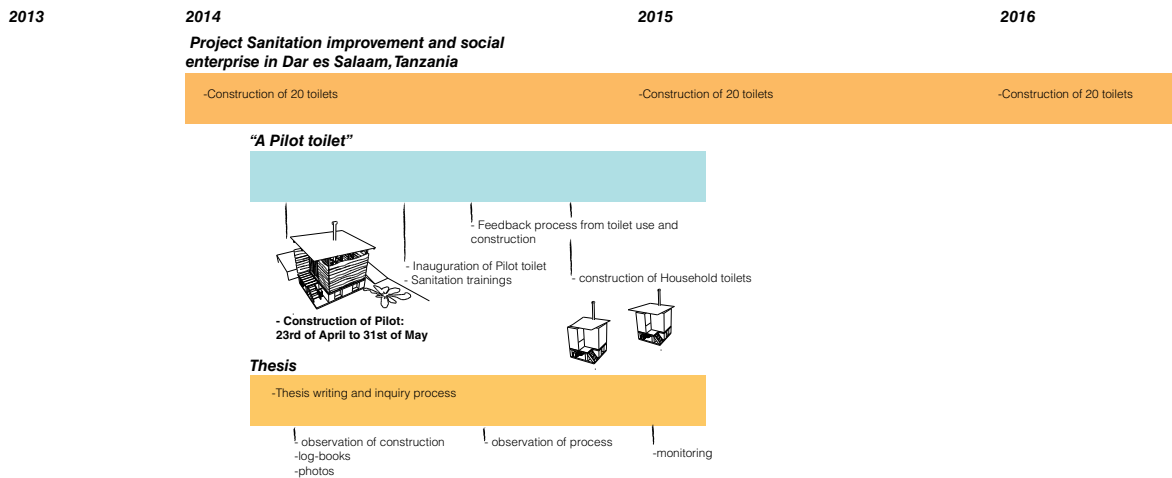
This study is divided in three parts. **Part I**, divided in three main sections, deals with the context analysis and theoretical framework in which the practical inquiry of **Part II** is operating. In section **I.1** I am first looking at the context in which I operate, namely the lack of sanitation in informal settlements of the global south. This is done to give some ground to the practice of Part II, but is also intended as part of the practice as a first step towards understanding a situation or problem and its complexity. Secondly in **I.2** with help of a theoretical framework comprising theories from the fields of planning, systems thinking and innovations, I analyse the case of lack of sanitation in Dar es Salaam and the opportunities of my own practice within this specific context. Thirdly in **I.3** I am looking at placing my practice in correlation with other architectural practices and theories focusing on the social and political role of architects and architecture. This is done partly through interviews to architects discussing their ways of practicing architecture, and a framework made of theoretical texts on architecture and participation and “spatial agency”, which in turn help situate the practice of Part II. The context analysis and theoretical framework suggested for planners is an integral part of the practice.

In **Part II** I expose my practical inquiry consisting partly in the construction of the “Pilot Toilet” and partly in the observation (with help of photos, log book extracts, a video and drawings, interviews to users and actors, and reflections) of the processes of doing architecture in this particular context. In **II.1** I expose the methods used during my experience, and in **II.2** I reflect upon the insights this practice has brought to light, which, in turn inform my role as an architect in this context.

The thesis concludes in **Part III**, where I expose the outcomes from the first phases of the experiment **III.1** and assess my own choices and methods as an architect and the actual impacts of the work on the main actors, users and direct cooperation partners as well as local authorities, through a clear classification of the merits and limitations of the full inquiry. I also expose possible ways forward **III.2**. Finally in **III.3** I discuss my process of thoughts as well as the outcomes and give my conclusion. As a future prospect I propose that this study be taken further to elaborate possible methods, practices, processes and approaches that can be relevant for future practitioners, NGOs and communities involved in such contexts and solving the wicked problem of lack of sanitation in Dar es Salaam.

1. 4. TIME FRAME

The empirical inquiry is carried out over a period of approximately 12 months **from February 2014 to March 2015**, starting with the planning and construction of the **“Pilot Toilet”**, continuing with observations, monitoring and evaluation of the construction and use. Also included in the practical inquiry is the **monitoring** of the construction process of **several household toilets** (reproduction phase), which are built by the local community, using similar techniques to “A Pilot toilet”.



City in Transition studio



1. 5. METHODS

Practice-led research or Performative research:

The main method used in this work is closest to Smith's et al. (2009) practice-led research, which is to be understood as "*both* the work of art as a form of research and the creation of the work as generating research insights which might then be documented, theorised and generalised".

Here the practice-led research the "Pilot Toilet" is in between Brad Haseman's performative research building on J.L Austin's notion of performative speech acts as "utterances that accomplish, by their very enunciation, an action that generates effects" (HASEMAN 2006), in the sense that "they not only express the research but in that expression become the research itself" (2006), and Barbara Bolt's (2007) view on practice-led research which is "less" about the artwork as a research expression but and "more" about the kinds of insights which can develop out of practice and can then have a more general applicability" (2007), although in this inquiry there is no "less" or "more" but rather a need for the practice to be part of a learning process where generalising the findings becomes part of the larger process.

In this manner the "Pilot Toilet" is not to be understood as a symbolic expression but rather the expression of "a way to dive in, to commence practising to see what emerges" (HASEMAN 2006), where "diving in" is an intuitive but also intentional step towards formulating my own way of "doing architecture" and start a dialogue with other past, current and future "other ways of doing architecture" (see part I.3.1) and contribute to proposing ways of doing architecture that respond to the growing need for holistic approaches to complex problems.

To corroborate the practice-led research a combination of various methods are used during practice ranging from quantitative to qualitative research methods, they are to be seen as part of the performance, like Haseman argues both the artwork here the "Pilot toilet" and the other practices (methods below) are research (2006).

Lastly to be able to build on this practice-led research as Bolt argues; that when such a practice is written up "particular situated and emergent knowledge has the potential to be generalised so that it enters into dialogue with existing practical and theoretical paradigms" (2007), the merits, limitations and ways forward will be written up (or drawn) for others to use and build upon.

Participatory action research:

to be understood as the active participation of researchers and participants in the co-construction of knowledge; the promotion of self- and critical awareness that leads to individual, collective, and/or social change; and the building of alliances between researchers and participants in the planning, implementation, and dissemination of the research process (McINTYRE 2008). Consists in the planning, construction, monitoring and evaluation phases of the "Pilot Toilet", a semi-private dry toilet for a Youth centre in a slum of Dar es Salaam, Tanzania that is done in collaboration with the local NGO CCI and a local community from the federation of urban poor,

PHAST Ujenzi. These phases are in turn observed, and reflected upon and outcomes formulated.

Monitoring and evaluation:

Consists in a set of qualitative and quantitative indicators. The questions are asked by actors, beneficiaries and collaborators of the “Pilot Toilet” to gain knowledge on the participatory planning and construction methods applied and on the success or failure of the toilet design. The evaluation consists in a questionnaire that can be found in Appendix 5 and some of the interviews/data are collected and visible in a short documentary about “A Pilot toilet” private dry toilet construction (see appendix 3).

Interviews:

I interview/engage in a dialogue with professional architects to gain insight on their ways of “doing architecture”, and the reasons for approaches in their every day work.

Ethnographic methods: Qualitative methods of data collection, such as interviewing, observation, and document analysis, have been included under the umbrella term of “ethnographic methods” in recent years. In this case the ethnographic methods include, photo documentation, drawings, observation in form of a log book and videos. These will focus on the communication patterns with/of the participants, interactions between/with participants, methods used, processes of planning, design and knowledge sharing.(KAWULICH 2005)

1. 6. ABBREVIATIONS

CCI: Centre for community Initiatives Tanzania.

SDI: Shack/slum dwellers international

TFUP: Tanzania Federation of the urban poor

PU: PHAST Ujenzi

PHAST: Participatory Hygiene and Sanitation Transformation

WHO: World Health Organisation

UN: United Nations

GDTAF: Global dry toilet association of Finland = Käymäläseura Huussi Ry.

DSM: Dar es Salaam

DAWASA/DAWASCO: Dar es Salaam Water and Sewerage Corporation

CIUP: Community Infrastructure Upgrading Program

MDG: Millennium Development Goals

WTO: World Toilet Organisation

MDG: Millennium Development Goals



"Excremental surplus, indeed, is the primordial urban contradiction" (Davis 2006).

PART I. CON- TEXT AND FRAMEWORK

Some problems are more complex than others. Some are even “wicked”, and are a combination of economic, social, ecological and sometimes political systems interacting with each other and in constant movement. In addition, “wicked” problems are a collection of multiple diverging interests, institutional uncertainties and imperfect knowledge (McPHEARSON 2013). Their very nature is that they can not be exactly defined.

Sanitation is something that concerns all of us and everywhere. In some places its provision is sufficient and understood. In other regions of our world it isn't. In some of the large cities of the global south, slums and their symptomatic lack of infrastructures including water and sanitation, result in hundreds of millions of people suffering from the consequences of such situations (UN-HABITAT 2003). In these contexts lack of sanitation and the attempts at improving the situation are the results of large scale, complex, hardly definable issues, in other words a wicked problem.

As part of an architect's or a planner's work, is the process of planning and creating places and spaces for people to live in and in which all aspects of human life unfold - be

it social, political, cultural and environmental. Climate change, scarcity of resources, the negative impacts the built environment can have on people and the environment at large, today we know the urgent need “to find alternative design approaches that will enable us to consider the large scale differently than we have in the past” (MOSTAFAVI 2010). And in that very process of creating and rediscovering these other approaches, architecture, architects, planners and the processes involved in the creation of places and spaces, have an opportunity for transformation (BLUNDELL JONES, PETRESCU & TILL 2005).

WHEN INVOLVED IN RESOLVING WICKED PROBLEMS, LIKE THE LACK OF SANITATION IN INFORMAL SETTLEMENTS, WHAT COULD BE THE ROLE OF THE ARCHITECT?

I. 1. SHIT AND CITIES

I. 1. 1. Lack of sanitation

As defined by the World Health Organisation (WHO) sanitation “generally refers to the provision of facilities and services for the safe disposal of human urine and faeces”. And inadequate sanitation, its counterpart or the non-provision of these facilities, “is a major cause of disease world-wide” (WHO N.D.).

In 2002 the appellations “improved sanitation” and “unimproved sanitation” (see glossary), established by the *WHO/UNICEF Joint Monitoring Programme for Water Supply and Sanitation* (JMP) for monitoring purposes in the pursuit of the Millennium Development Goal target number 7 C (see glossary) for 2015 (WHO/UNICEF N.D.), emphasized on the notion of hygienic separation of human excreta from human contact. In this manner making a clear separation between improved and unimproved technologies.

Many adjectives, words have been added to the word sanitation: basic, adequate, sustainable, ecological... Trying each time to redefine and refine the definition of sanitation, through different perspectives agendas and for different purposes, making sanitation in its own right a highly complex and complicated topic.

I would like to specify that sanitation as employed in this thesis is to be understood as an open system and as a whole rather than simply a facility at a specific scale i.e. user scale, community scale or city scale.

“The primordial urban contradiction”:

Dealing with shit adequately in cities has repeatedly proven to be necessary, as

The Millennium Development Goal 7, Target 7C calls on countries to **“Halve, by 2015, the proportion of people without sustainable access to safe drinking water and basic sanitation”** (from 1990).

excreting is a primary condition and dealing with excreta inadequately, when produced in large quantities in places where the population is densely settled and numerous, can have grave consequences.

“Excremental surplus, indeed, is the primordial urban contradiction ... The subject, of course, is indelicate, but it is a fundamental problem of city life from which there is surprisingly little escape. For ten thousand years urban societies have struggled against deadly accumulation of their waste; even the richest cities only flush their excrement downstream or dump it into a nearby ocean”. (DAVIS 2006).

The inevitable need of cities to excrete and the consequences of such a condition when abundant, raises the questions that every city in the world is faced with; “What to do with all that shit”? and “How to handle it”?

In 1969's *The Economy of Cities*, Jane Jacobs', in a paragraph called *Cities as Mines* where she recognised in an almost premonitory way that cities of the future will be mining resources from within their own walls, namely through recycling. She also was convinced in that same perspective that flushing excreta away was not only wasteful

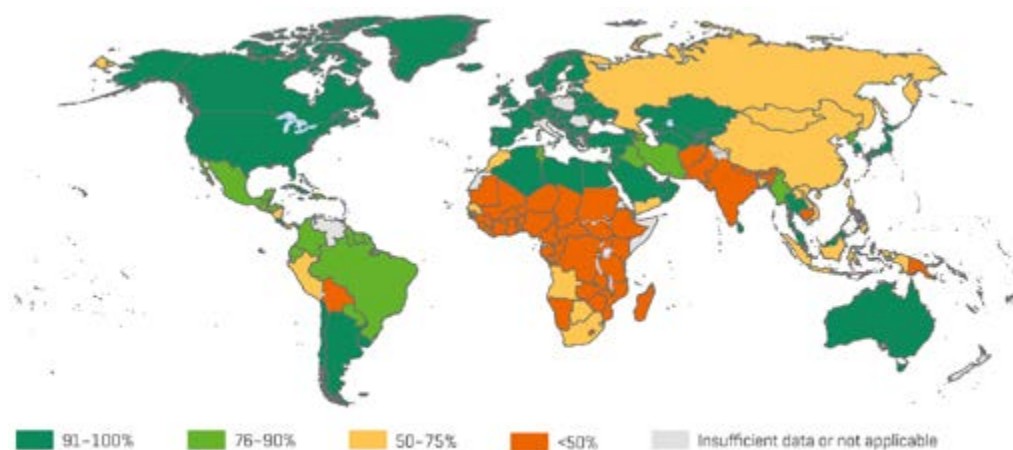
but also “extraordinarily primitive” (JACOBS 1969) and went further to say:

“It is amazing that we continue to use such old-fashioned makeshifts. Excrement in sewage complicates the handling of all city waste waters, including even the runoff from rainstorms, and exacerbates all the problems of public health connected with water pollution.”

She envisioned the future large cities mining excrement and collect toilet waste as “residues” like “any other non-water-borne wastes [...] burned to small amounts of dehydrated and sterilized phosphates and nitrates”. In this way not only avoiding initial pollution but even gaining extremely valuable raw materials from the process.

Looking at the overall situation of sanitation today, we can easily say that we are not there yet, at all! Only recently, in 2010 the United Nations General Assembly “declared safe and clean drinking water and sanitation a human right essential to the full enjoyment

of life and all other human rights“ (UNITED NATIONS 2010). Despite this leap forward in advocating for the simple right to a safe environment through the provision of sanitation is far from the huge mindset shift Jacobs was talking about, where the belief that excreta is a waste and needs to be disposed of as far as possible from human settlements had been completely eradicated.



Proportion of the population using improved sanitation in 2012
fig. 1. (WHO/UNICEF, 2014)

A clear divide:

While we are far from a shift of mindset upon the matter of excreta and whether or not it is of any value, worldwide 2,5 billion people still lack access to “improved” sanitation facilities (WHO/UNICEF 2014), out of which 1 billion practice open defecation. Particularly alarming are the rates of lack of access to improved sanitation in Sub-Saharan Africa; out of the 69 countries not on track to reach the MDG’s sanitation target 36 are in Sub-Saharan Africa. It is increasingly concerning as Africa will witness some of the highest urbanisation rates in the near future and cities which are already facing challenges to meet the needs of the current populations will be under even greater pressures (UN, DEPARTMENT OF ECONOMIC AND SOCIAL AFFAIRS & POPULATION DIVISION 2014).

Despite these alarming numbers some progress has been made; between 1990 and 2012. Even if still widely practiced in India, open defecation decreased from 24 per cent to 14 per cent globally. Parts of the world have even seen greater improvements like Ethiopia with a decrease from 92 per cent to 37 per cent of open defecations.

Needless to say that it is not enough as populations, especially in cities grow faster than the rate at which sanitation is provided; today only 5 countries in Africa are on track to meet the Millennium Development Goals’ (MDG) sanitation target (WHO/UNICEF 2008) and the whole Eastern Africa is off track to meet the target by more than 20 points and need to increase their efforts seven fold to meet the MDG sanitation target. The same document tells us that if African countries continue on the same trend the sanitation coverage required that is 66% (50 per cent more than present average) will be missed by more than 20 points. For Eastern Africa the gap between both trends is 32

points (real trend 31% MDG target 63%). In Tanzania in 2006 it was only 33% of the total population who had access to improved sanitation.

Alarming numbers and trends in developing countries force to draw a parallel to how provisions of sanitation has evolved and is now perceived and dealt with in the west.

The flush toilet:

Today most, if not all, people have access to improved sanitation, 95% (fig.1) (WHO/UNICEF 2014), predominantly in form of a flush toilet.

The establishment of the “final toilet” (fig.3) (KOOLHAS 2014), essentially what we know as the flush toilet - or “the western system - in which the toilet is wet and the cleansing is dry...” - , is that after achieving the acceptable standards of hygiene and function it was not questioned or revisited for more than 100 years (KOOLHAAS 2014). Abby Rockefeller in *Civilization and Sludge* points out that at the time the flush toilet was invented,

“The engineers were divided again between those who believed in the value of human excreta to agriculture and those who did not. The believers argued in favour of ‘sewage farming’, the practice of irrigating neighbouring farms with municipal sewage. The second group, arguing that ‘running water purifies itself’ (the more current slogan among sanitary engineers: ‘the solution to pollution is dilution’), argued for piping sewage into lakes, rivers, and oceans.” (ROCKEFELLER 1996)

So the flush toilet was soon adopted as the basic sanitation technology and no one has

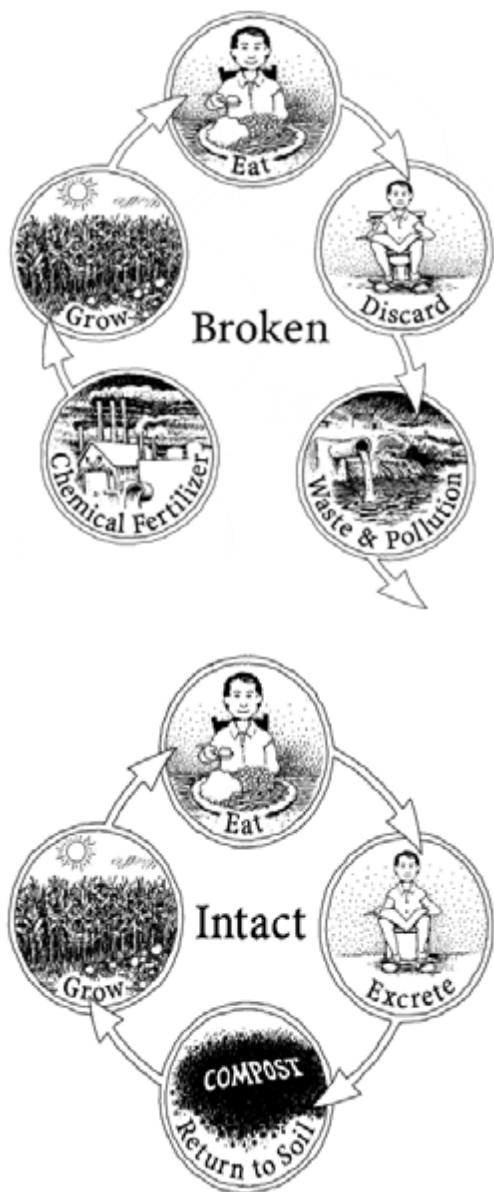


fig. 2 (Jenkins 2005)

really had the chance or power to put it into question and change things around for a less polluting and “primitive” (JACOBS 1969) solution.

If we are to look back at the possible reasons why flush toilets were adopted here is a glimpse of an answer.

The pit privy is the most common type of

“sanitation solution” found in the London and Paris of the 1830 and 1840’s when cholera and other diseases were found to kill those who had been in contact with excreta. Once the houses were given direct access to water it was only logical to add a toilet and the flush toilet was the direct answer to the outhouses’ main problem, smell, causing people to choose the nearby bushes. (ROCKEFELLER 1996)

But “*The pit privy is not, from an environmental point of view, anywhere near as damaging as the flush toilet, but the kind of damage it caused--and still causes--is of a piece with the kind caused by the string of technologies, flush toilet included, that evolved in response to the pit privy’s inadequacies.*”

“*Wherever on the globe there were sewers, the recipient rivers, lakes, and streams were discovered to have become unacceptably filthy, and in response came pressure to treat the sewage before it entered those waters. And so began the “treatment” phase of the get-rid-of-it approach to dealing with wastewater now consisting of human excrement mingled with all industrial wastes transported by water.*” This is where we are now enjoying a system that takes away nutrients from earth and doesn’t give it back and instead pollutes (fig.2).

Above all Rockefeller says “*Central collection and treatment of sewage cannot be said to have succeeded in solving the underlying problem of water pollution caused by using water to transport wastes. The problem is deeper and systemic.*”. I would even go further and say that the problem is paradigmatic. The way we perceive our excreta, our modern bathrooms and all cultural things attached to it are so imbedded in our cultures and habits that only an unstoppable and life threatening force would make us

revise the current dominant model.

We are at a point where the prevailing model of the flush toilet that allows us to instantly separate ourselves from our discharges with a simple flush (or half flush) has shown to have failed in many ways; not only environmentally but also at eliminating other valid and less destructive typologies and threatens to take over all other alternatives, “sitting, defecating in water, using paper - is especially alarming since all three aspects are fundamentally dubious” (Koolhaas 2014). The “final toilet”, dominant model used in Europe and U.S.A, has it wrong as it uses water in which we defecate and paper (dry) with which we cleanse ourselves (wet) (fig.3). Logic should tell us to reverse the process, “water is better for cleansing the body” and dry to shit in. But this requires a fundamental shift in mindset in the way we think about our bodily excretions.

In pursuit of this change of attitude Jack Sim, World Toilet Days’ founder had managed to put it very simply and concisely:

“The human body is designed to separate solids from liquid waste”.

While we need to look at solving the problem of lack of sanitation, we also need to be aware and not repeat insanities of the past by copy-pasting failing models and creating problems downstream which would in the long term only exacerbate the already vulnerable populations of the global south.

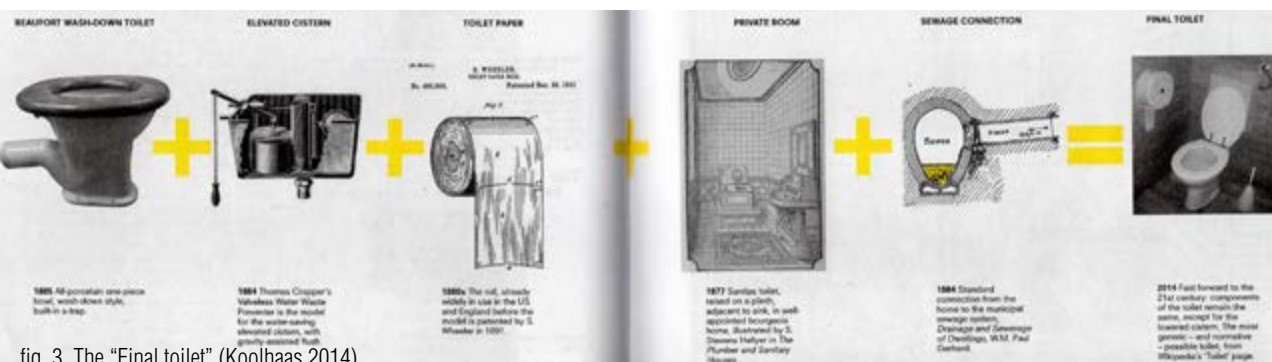
I. 1. 2. Lack of sanitation and informal settlements: expressions of unresolved and growing complexity

The complex context of fast urbanisation coupled with sanitation issues, in a rapidly changing world, where large sections of the population, are already impacted by large scale changes such as climate change, rising sea levels, unpredictable weather conditions, unstable economies, necessitate approaches that allow populations and experts as well as the political spheres to understand issues at large and consequently respond to it adequately.

A vicious circle:

Today more than half of the world’s population (54%) is living in cities (UN, DEPARTMENT OF ECONOMIC AND SOCIAL AFFAIRS & POPULATION DIVISION 2014) of which an estimated 863 million reside in slums in the developing world (UN 2013).

Despite the MDG target 7D, that is to improve the lives of at least 100 million slum dwellers, having been achieved the absolute number of slum dwellers continues to grow due to fast pace urbanisation, especially in Asia and Africa where 90% of the global population increase, till 2050, is expected to happen. Particularly fast growing and less developed cities are found in Sub-Saharan



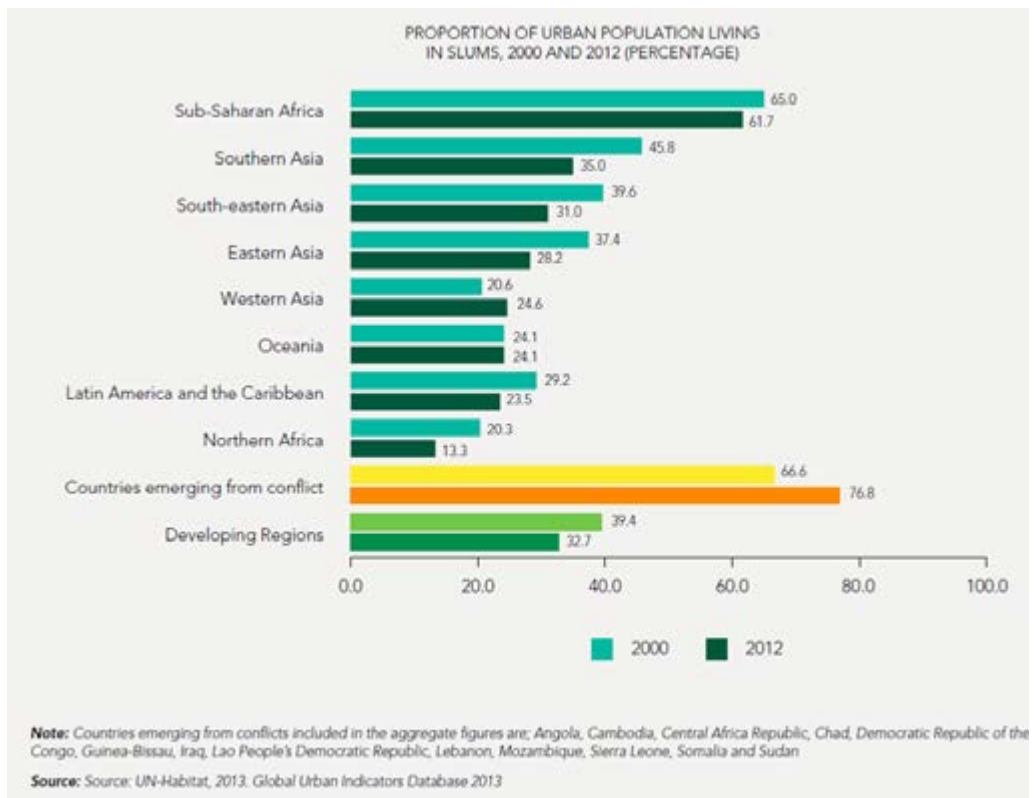


fig. 4

Africa where a striking 61.7% of the urban population lives in slums (UN-HABITAT 2013, GLOBAL URBAN INDICATORS 2013) (fig. 4).

Even though slums, also called informal settlements, or shanties, all hugely differ in appearance, the poverty level of their inhabitants, security of the land or access to basic infrastructures, the common physical manifestations of slums are usually:

- ~ lack of access to basic infrastructures
- ~ unplanned areas
- ~ self built housing
- ~ lack of access to less crowded or more durable housing...

These physical manifestations are the pervert outcome of complex, large and intricate issues, in which the urban poor is physically excluded from the decision spheres and has little power to change things and make deci-

sions. Some of these physical manifestation or symptoms are hindering the growing slum populations to get out of a vicious circle which if not broken will see more and more slum dwellers become more and more vulnerable to more and growing challenges.

Increasingly, urban poor dwellers are facing deepening inequalities in regards to the access to health care and other services and infrastructures (DAVIS 2006). In 2003 the UN-Habitat report *Challenge of Slums*, that still counts as the groundwork raising attention on the global urbanisation issue of informal settlements, indicated that "in general, the locus of poverty is moving to cities, a process now recognized as the 'urbanization of poverty'. The same document qualifies the statement by saying that "Slums and poverty are closely related and mutually reinforcing, [...]" (UN-HABITAT 2003) and although "Slums are a physical and spatial manifestation of

urban poverty and intra-city inequality.” they do “not accommodate all of the urban poor, nor are all slum dwellers always poor.” (UN-HABITAT 2003).

Three years later Mike Davis in the 2006 Planet of Slums where he depicts the conditions in which most slum dwellers live all around the world, was indicating yet another phenomenon; the “double health burden” of the urban poor:

“...health problems inequalities do not exist between towns and countrysides, but between the urban middle classes and the urban poor” (DAVIS 2006).

Slum-dwellers suffer from a double burden (DAVIS 2006), being “the interface between underdevelopment and industrialisation, and their disease patterns reflect[ing] the problems of both. Infectious diseases and malnutrition on the one hand and chronic

and social diseases on the other hand (WERNA, BLUE ET AL. 1996).

It is easy to conclude that the urban poor are the ones more likely to suffer from any sort of pressure be it economical, climatic or political, they are the ones with least resources to respond to threats. In the words of conclusion of the Challenge of Slums report a direction was given to start answering the challenge:

“Clearly, the task is how to ensure that slums become an integral, creative and productive part of the city. The broader context, therefore, has to be good, inclusive and equitable urban governance. But inclusive and equitable urban governance requires greater, not less, involvement of the state at both the national and local levels. Particularly needed in this respect are equitable poli-



A traditional pit latrine: most commonly found type of toilet in the slums of Dar es Salaam.

cies for investment in urban infrastructure and services.” (UN-HABITAT 2003).

Historical weight:

Cities of today, cities of yesterday have struggled for millennia with the fundamental problem posed by the “deadly” and inevitable accumulation of waste. To cite Mike Davis again, the “global sanitation crisis defies hyperbole.” Davis sees a direct connection with colonialism, when

“The European empires refused to provide modern sanitation and water infrastructures in native neighbourhoods, preferring instead to use racial zoning and cordons sanitaires to segregate garrisons and white suburbs from epidemic disease; postcolonial regimes from Accra to Hanoi thus inherited huge sanitation deficits that few regimes have been prepared to aggressively remedy.”

DSM is a comparable example for that phenomenon. Under German rule DSM adopted plans for urban segregation that were “put into effect in 1924 amendments to the Township Rules, when the town was split into three zones [...] resulting in a town of racially and/or socially segregated neighbourhoods that in some cases have existed up to the present” (BRENNAN, BURTON & LAWI 2007). Not only did those successfully result in racial segregation at the time but are still at the heart of the present problems of development infrastructure, lack of basic services, amenities, and density (BRENNAN 2007).

Yet the diverse nature of residential community emerging after independence in 1961

indicated a wide range of different living conditions.

“Those suburbs located close to the coast and north of the city centre, [...] remained exclusive, [...]. Other planned suburbs, such as Upanga [...], were also blessed with better infrastructure and more accessible services and amenities.[...] Outlying suburbs like Kinondoni [...] housed an emerging African middle class.”

As for the conditions in the growing “shanties”,

“were rather worse. These often labyrinthine settlements were generally hidden from the view: external buildings lining the roadside tended to be of better quality construction than those in the interior of a settlement and were generally commercial rather than residential [...]. Often located in low-lying areas shanties were prone to flooding; though lack of access to clean water was a greater problem, leading to poor sanitation and a high prevalence of disease. Other infrastructure and services, including roads, electricity and health facilities were similarly basic or lacking.” (BRENNAN 2007).

Zoning, post colonial heritages, World bank programs, SAPs (Structural Adjustment Programs by the International Monetary Fund), have contributed in aggravating or helping the growth or perpetuation of the many informal settlements of numerous cities in the developing countries, which pose some of the greatest challenges of our time.

Climate inadaptation:

The lack of basic infrastructures as one of the typical traits for informal settlements is not only problematic because of its direct impacts on its population's health or well-being, but also because of their nature as being areas unadapted to the consequences of climate change extreme weather occurrences.

For example in Tanzania climate is known to be driving towards increased "occurrences of extreme weather events [...], including rainstorms, droughts and sea level rise" (KEBEDE & NICHOLLS 2011) and in a study conducted by the Pan-African START Secretariat in slums from the "lowlands", showed that the "top five environmental risks as perceived by the local communities were flooding, temperature rise, drought, increases in disease, and air pollution" (PAN-AFRICAN START SECRETARIAT ET AL. 2011). According to Watkiss et al. "flooding is exacerbated by poor planning, the poor drainage system and housing conditions, and lack of capacity of the local communities to adapt to flooding (WATKISS ET AL 2011. CITED IN KIUNSI 2013).

Lack of sanitation is more than often related to other problems, either directly or indirectly and resolving such a situation is never a straight forward answer.

We have seen above that lack of sanitation in informal settlements is an expression of a myriad of related issues – political, social, historical, and global - that cannot so easily be identified or answered. And that way to solve these issues is just as complex as the issue itself. And many cities like DSM struggle to answer the question: What to do with the inevitable and growing production of excreta from cities of the global south and the chronic lack of infrastructures resulting in

feeding a failing system? while other actors might be asking themselves: "Is the lack of access to improved sanitation facilities caused by the single political unwillingness to solve the problem?" or "Is it the straight consequence of a colonial history and its unadapted policies that still have an effect on today's global south city planning?" or finally "Is it all because of the local governments' lack of resources and consequent incapacity to deal with the incessant flow of new dwellers?". Jane Jacobs could argue that slums or lack of sanitation do not have causes, just like poverty does not have causes. It is prosperity that does in this case access or provision of improved sanitation or planned and serviced settlements. (JACOBS 1970 P.117-121)

While the effects of poor sanitation in informal settlements are rather clear, leading to bad health and regulating the chances of people getting access to education or diversifying their social circles, although not all known, the causes or "problems" and solutions are difficult to define and present a clear case of a "wicked problem". In the following section we will explore the lack of sanitation from a specific case, the city of DSM in Tanzania. Through this inquiry we can identify the nature of the problem of lack of sanitation and some of the causes that might hinder its resolution. What system around sanitation? What could be the causes for a lack of agency? Sanitation in Dar es Salaam a wicked problem?





I. 2. THE EXAMPLE OF DAR ES SALAAM: SANITATION A “WICKED PROBLEM”

In this section I continue to examine the factors that influence the perpetuation of informal settlements and the symptomatic lack of sanitation, but this time through the spectrum of Dar es Salaam (DSM), Tanzania. Informal settlements make up 70% of the city's population and about 80% of the population does not have access to improved sanitation facilities.

I. 2. 1. Tanzania's situation

Tanzania is the biggest country in East Africa with a total population of 44,9 Million people (NATIONAL BUREAU OF STATISTICS ET AL. 2014). About 30% (mainland) (NBS ET AL. 2014) of the population lives in cities while the rest lives in rural areas. Tanzania's total CO₂ emissions per capita is one of the worlds lowest with 0.15 metric tons compared to 11.53 for Finland (WHO 2010). The energy demands in Tanzania are supplied to 90% by biomass (wood) consumed primarily in rural areas and contributing extensively to deforestation. On the other hand DSM gets its energy supply mostly from Hydro-powered plants, but suffers from recurring power cuts (MATYELELE MSYANI 2013). The average growth for power demand is 10 to 15% per annum but Tanzania can not cope with the growing energy demand as it is lacking monetary resources. The country has known more regular periods of draught and some areas in Tanzania are witnessing a loss of natural

habitat over the whole country affecting the country at large. As cities will continue to grow in Tanzania and the energy supply demand will too, Tanzania and especially its cities like DSM are faced with great challenges, that can have great effects on the country's stability and environment as populations will continue to move from rural to urban areas. Nation wide the sanitation coverage is about 90%, but the number does not say much about the reality as 40% of the total population uses pit latrines (JMP 2010), which are unimproved facilities according to the WHO and the practice of “seasonal” flushing (BPD 2006) is often practiced in informal settlements (i.e. Deliberate use of floodwater to flush the contents of latrines). Additionally only 12% of the total population has access to “improved” sanitation facilities (JMP 2014).

I. 2. 2. Dar es Salaam a slum city!

Sustainability, climate change, resource scarcity, fast urbanisation, pollution, lack of sanitation, informal settlements, lack of planning, historical floods, waste management issues, lack of infrastructures, lack of political will, corruption, foreign interests, policy issues, a heavy historical weight and ever growing economic pressures. It seems all possible problems of the modern and 19th century cities are hitting DSM at once!

DSM (fig. 5) is the economic capital of Tanzania, with more than 4 Million people (2012) and an annual population growth rate of 4,39% p.a. (CITY MAYORS STATISTICS 2015) it is a fast growing city (9th fastest in the World). At this rate Dar es Salaam's population will reach more than 6 Million in 2020.

Situated along the East African coast of the Indian Ocean, the city is rather flat, and can be topographically divided into three areas; the "*lowlands*, along the Indian Ocean shores and the river valleys of the four main river systems of Mpiji, Msimbazi, Kizinga and Mzinga that cut across the city" which are rather swampy, "*the middle plateau*, and the upland zone with hilly areas in the north and west of the city." (NATIONAL ENVIRONMENTAL MANAGEMENT COUNCIL 2009). The climate is tropical wet and dry but mostly hot and humid with two rainy seasons, during which flooding is frequent and severe in many parts of the city especially in unplanned areas where it is "exacerbated by poor planning, the poor drainage system and housing conditions, and lack of capacity of the local communities to adapt to flooding" (WATKISS ET AL. 2011 CITED IN KIUNSI 2013). Floods also influence the prevalence of cholera epidemics and typhoid (PAN-AFRICAN START SECRETARIAT 2011).

Administratively Dar es Salaam is divided into three Municipalities (fig. 5); Kinondoni, where most of the offices and planned areas are located; Ilala, with the harbour and most of the government buildings; and Temeke with most of the industries.

The livelihood of most of DSM's population depends on activities of the informal sector; these activities include urban agriculture, fishing, small mining activities, petty trade, vending of cooked and uncooked items, vending of used clothes... (PAN-AFRICAN START SECRETARIAT ET AL. 2011).

Lack of planning:

There is little effective land use management and the last master plan dates from 1979. According to Robert Kiunsi, a senior lecturer of Ardhi University's school of Environmental Science and Technology, the lack of master plan and development control has influenced the disorganised and random development of the city (KIUNSI 2013), contributing when combined to high urbanisation rates to the large informal settlements found around DSM.

What causes slums to perpetuate? What causes lack of sanitation in these informal settlements? Even if it is possible to identify some of the forces that allow slums to grow and perpetuate these forces cannot be considered as causes, as slums are rather an absence of planning, planning, which organised cities are made of. The question should be: What causes organised cities? Sure, slums emerge and perpetuate under different influences, like rapid rural-to-urban migration, lack of housing supplies, lack of planning among the many factors, but planning is the key to what slums are lacking.

The lack of planning in DSM is symptomatic of a city in arrested development, where lo-

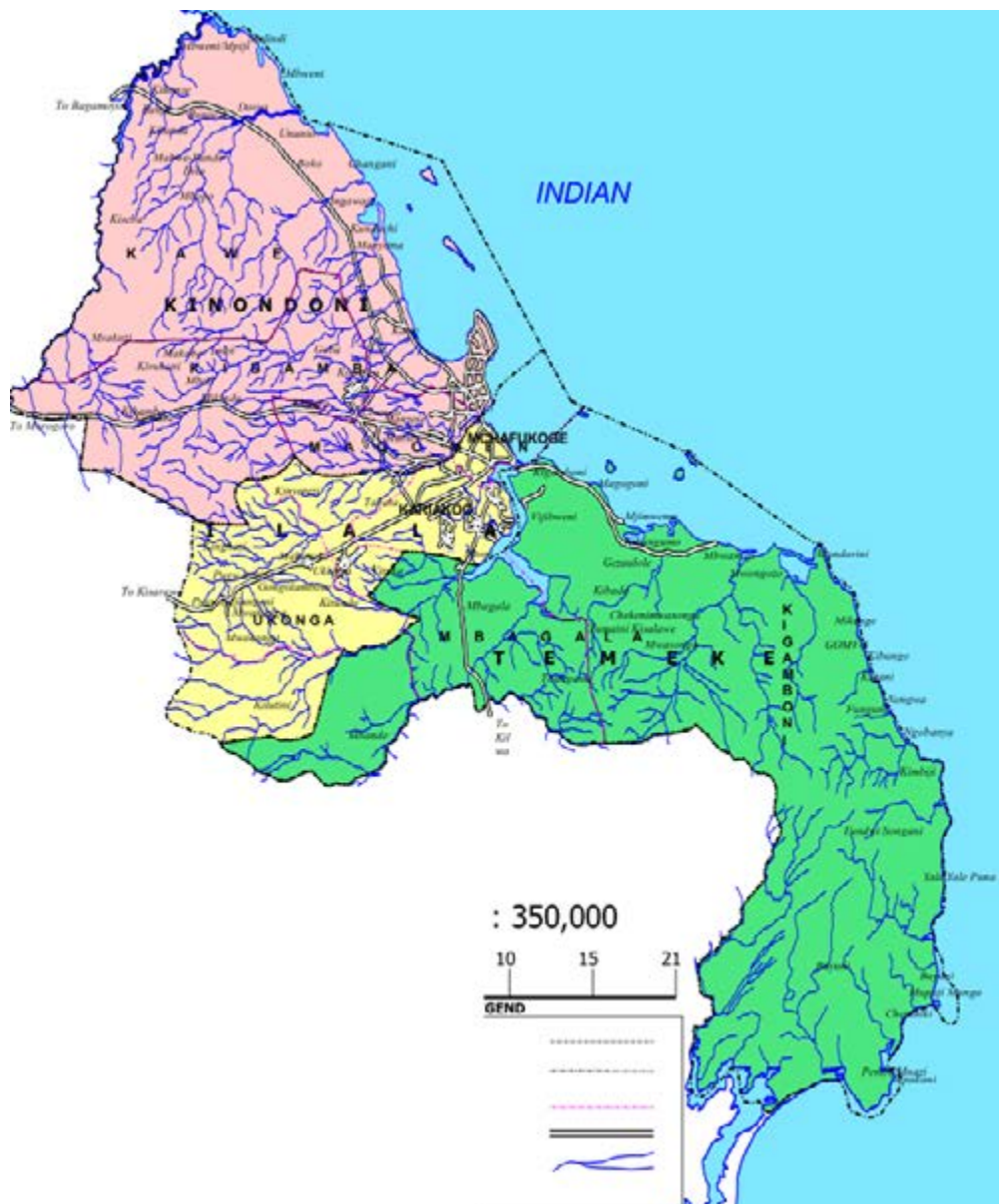


fig. 5

cal authorities are economically and structurally overwhelmed with the urgency, amount and intricateness of issues.

In the coming years DSM's population is likely to continue to "grow prodigiously", "despite ruined import substitution industries, shrunken public sectors, and downwardly mobile middle classes" (Davis 2006), while at the same facing great development deficits. The city needs to act on developing a city

plan and adapting for climate change, things "that need to be planned for" says Kiunsi. Today a number of programs and texts are trying to address some of the development deficit issues by prioritising the "social and economic conditions and infrastructure" but it seems the financial knowledge and awareness of local government bodies and general public (employees, general public) is too low compared to the degree of importance and urgency (Kiunsi 2013).



He let his mind drift as he started at the city, half slum, half paradise. How could a place be so ugly and violent, yet beautiful at the same time?" (Abani 2004).

The systems around sanitation are a mess:

First of all sanitation in Tanzania is handled as “a cross-sectoral issue”, resulting in a lack of “leadership and direction, and chronic under-funding”; four ministries are in charge. The Ministry of Health and Social welfare (MoHSW) is the main ministry as sanitation and hygiene play a great role in reducing and preventing diseases, although, “the issue has a low profile within the health sector”. The Ministry of Water and Irrigation (MoWI) used to play a role due to the fact that sanitation and water supply traditionally go hand in hand. But “sanitation has tended to be an add-on to water policy development until recently”. The ministry of Finance and Economic affairs (MoFEA) is in charge of intra-government funding and for the overall planning and budgeting and finally the Ministry of Education and Vocational training takes care of the use of water resources for irrigation, industrial use and energy generation. In 2009 a Memorandum of Understanding was signed between the four ministries in charge to facilitate communication on the matter.

But the intricateness of the issue does not stop at the executive level; in the legislative sphere there is no single piece of legislation guiding for “provision of environmental health services. “The Public Health Act (2009) has provisions for sanitation and hygiene, while the Water Supply and Sanitation Act (2009) extends responsibility to utilities for the management and the monitoring of sewerage, wastewater disposal (including wastewater stabilization ponds and disposal of sludge from pit latrines), on site sanitation, and strengthening of the private sector, including in unplanned settlements.”(Gugu 2011).

Lastly the service provision itself is taken care of by local entities. For DSM the de-

centralised local government authority is DAWASA/DAWASCO; the sole provider of water supply and sewerage Services in DSM city and parts of the Coastal region. The corporation is responsible for the management, Operation and Maintenance of water supply and waste water disposal services. In reality the private company takes care of only 10% of the total population (proportion serviced by sewage), leaving 90% un-serviced and un-maintained. According to Faith Gugu;

“there is little public finance for software activities for on-site sanitation and no public financing allocated to hardware for on-site sanitation solutions. This shows that the bulk of public funding is allocated to sewers (whereas only 10% of the population is connected to the sewer network) and to wastewater treatment (which benefits a mere 3% of the population). Overall, only 0.9% of public funding on capital investments goes to on-site sanitation services, while these are the sanitation solution for 83% of the population.” (GUGU 2011)

Action plans and projects for water and sanitation in DSM:

While the responsibilities for sanitation issues are rather blurry and it is difficult to point out a clear institution in charge and the provision of its services is completely inadequate to solve the situation, resulting in only 20% of the population having access to improved sanitation facilities, there has been a few alternative attempts to deal with the sanitation coverage in DSM, that were putting the accent on community involvement.

Two of these plans or actions; the CIUP (Community Infrastructure Upgrading Pro-

gram) and City Wide Action for Upgrading Unplanned and Un-serviced Settlements were put into action in 2004 and 2007 respectively.

The first, built on a two phase strategy until 2011 (MAZWILE 2013), was mainly focusing on upgrading roads to allow better transportation possibilities for people living in informal settlements. Nevertheless the program was found to have contributed to significant ameliorations in some of the acute development deficits of the target areas, like waste collection or better roads. Mainly the program, was found to be successful in its actual setup, that was focusing on a community-based approach (UN-HABITAT, CITIES ALLIANCE & DARES SALAAM LOCAL AUTHORITIES, 2010).

The second one working as a platform between all stakeholders involved in the upgrading of informal settlements and all ongoing programs dealing with similar subjects, is targeted to end by 2025. Similarly to the CIUP it is also based on community involvement which was found to be a “new, comprehensive, participatory and well-coordinated approach that avoids negative effects of upgrading and new developments on residents communities and prevents parallel expansion of unplanned developments” (UN-HABITAT ET AL. 2010)

As a result there is an emerging tendency for sanitation or infrastructure related issues to involve communities at all levels from preparation and planning phases to implementation and maintenance. But the capacities and actual actions remain too timid compared to the task; as an example DAWASA/DAWASCO's status has not been revised even though its actions are not responding to the actual need.

State of denial?

In the last words of the foreword the former secretary general of the United Nations, Kofi A. Annan sums it up that way:

“Slums represent the worst of urban poverty and inequality. Yet the world has the resources, knowhow and power to reach the target established in the Millennium Declaration. It is my hope that this report, and the best practices it identifies, will enable all actors involved to overcome the apathy and lack of political will that have been a barrier to progress, and move ahead with greater determination and knowledge in our common effort to help the world's slum dwellers to attain lives of dignity, prosperity and peace”.

DSM finds itself in a great mess or “apathy” with Anan's words, where it seems impossible to first of all identify one single cause, and secondly any common vision and neither any will nor adequate use of necessary resources for institutions or local governments to respond to the sanitation crisis that will not stop existing as DSM continues to grow exponentially!

Interventions from the grass roots - divergence or way forward?

In reaction to the national and local authorities' incapacity to address the sanitation situation and in their quest for a better living environment, local communities from the Tanzania Federation of the Urban Poor (TFUP), called “federations” have gathered to address the issue of lack of sanitation in their own settlements. These groups are supported by the Centre for Community

Initiatives (CCI) (affiliated to Slum Dwellers International, SDI, see description p. 38). What could be the impacts of such actions if implemented on a larger scale or supported adequately by the local government? How do these actions prove as valid towards tackling city wide sanitation issues?

PHAST Ujenzi (PU), is one of these “federation” groups. The members have gathered a few years ago to address the sanitation challenges they were facing in their area. At first, with support of a local NGO, they collected data with Geo-information techniques (Geo-tagging). With that data put on maps they were able to identify that the lack of adequate sanitation was most problematic and the source of many other issues, they were able to better understand their environment. The mapping also gave them a tool to start a dialogue with local authorities. Later, they were trained as technicians and were soon able to build toilets and offer maintenance services for the community.

Tim Ndezi, CCI's CEO, recently talked about PU as “pioneers and an example for the other federation groups” (this happened during a workshop I organised, in July 2014).

Their actions have been very fruitful and dense but there is a constant need for support, either from CCI or from other experts. Mostly what such actions are lacking is the greater support of local authorities, both financially and structurally.

These actions are scalable not only because the technology is ecological and innovative, but because the principles and methods on which they are based (SDI's methods, see description p. 38), are oriented towards giving the urban poor a voice and tools that enables their actions to cross the political, cultural, economical and social barriers (MOSTAFAVI, DOHERTY 2010), which

constitutes in itself an alternative approach to address large and complex problems such as the lack of sanitation.

PHAST or The Participatory Hygiene and Sanitation Transformation is an approach to improving hygiene behaviours and encouraging effective community management of water and sanitation services. The **PHAST** approach is based on the principle that the participation of communities in their own projects will empower the community and improve its decision making about the services it needs and wants to maintain. (WORLD BANK 2015)

To sum it all up:

- ~ Water and sanitation infrastructure malfunction in DSM is for much the result of a lack of planning but also in more recent days an unclarity of untransparency of the responsible institutions
- ~ General lack of planning partly as a historical result
- ~ lack of clarity from institutions
- ~ lack of clear policies and texts
- ~ too many actors without a clear common

goal

- ~ problematic privatisation of water and sanitation supplier and misuse of sanitation funds
- ~ lack of funding and knowledge
- ~ lack of a common vision
- ~ some actions plans but not sufficient
- ~ sanitation responsibilities in tanzania are unclear
- ~ unclear political setting
- ~ some actions from communities and NGOs but too little support from government and public funds.

I. 2. 3. Identifying lack of sanitation provision in DSM as a wicked problem

While the previous section helps to get an appreciation of the parts that make up the complexity of the problem of lack of sanitation in DSM we start getting an understanding that the problem might be lying in between the elements and that with the current actions no significant progress has been made in providing sanitation to the majority of the DSM population. In this section with help of “wicked problem” theories we go deeper in trying to understand the actual level of complexity of the problem of lack of sanitation in DSM and what should be considered when faced with the resolution of such a problem.

What are wicked problems?

The term “wicked problem” emerged out of the urban planning discipline in the Seventies and was formulated by Professor Rittel and Webber from the Berkeley University of California. In their coauthored paper called “*Dilemmas in a General Theory of Planning*” they confront “wicked” problems, to the other “definable, understandable and consensual” challenges urban planners had to deal with until the late 19th century: like creating roads. Essentially a “wicked” problem in opposition to what they call “tame” or “benign” problems - the ones that scientists and engineers are confronted with i.e. a problem of mathematics like solving an equation - are the ones related to societal issues with no clear traits that indicate whether they are resolved or not because they are made of continuously moving parts and people with different perspectives and beliefs.

Today for Peter J. Balint and colleagues “the essential ingredients of a wicked problem are [still] difficult to pin down. Although there are no sufficient conditions that serve as a test for identifying wicked problems, there are some conditions that generally accompany them” (BALINT ET AL. 2011). Balint and his colleagues in “*Environmental wicked problems*” propose list of properties and characteristics (see table I.1), adapted from Rittel and Webber’s (1973), that make up “wicked problems” gathering some propositions generally associated with wicked problems).

The criteria helping (table I.1), it becomes rather expedient to characterise the issue of lack of sanitation in DSM as a wicked problem or a problem that is “more complicated than others” (BALINT ET AL. 2011). But there is a great gap in between identifying a problem as complicated and being able to define a problem, which is what wicked problems essentially are: non-definable. Rittel and Webber before laying down the 10 properties of “wicked problems” remind us of the following:

“But then, you may agree that it becomes morally objectionable for the planner to treat a wicked problem as though it were a tame one, or to tame a wicked problem prematurely, or to refuse to recognize the inherent wickedness of social problems.” (RITTEL, WEBBER 1973).

Maybe the following remarks help in understanding how to deal with a wicked problem:

- ~ First of all “it requires that the **decision makers first have a common understanding** of the situation they are attempting to address” (BALINT ET AL. 2011)
- ~ then wicked problems need “a **smart**

Rittel and Webber’s list:

There is no definitive formulation of a wicked problem

Wicked problems have no stopping rule

Solutions to wicked problems are not true-or-false, but good-or-bad

There is no immediate and no ultimate test of a solution to a wicked problem

Every solution to a wicked problem is a “one-shot operation”; because there is no opportunity to learn by trial-and-error, every attempt counts significantly

Wicked problems do not have an enumerable (or an exhaustively describable) set of potential solutions, nor is there a well-described set of permissible operations that may be incorporated into the plan

Every wicked problem is essentially unique

Every wicked problem can be considered to be a symptom of another problem

The existence of a discrepancy representing a wicked problem can be explained in numerous ways. The choice of explanation determines the nature of the problem’s resolution

The planner has no right to be wrong (RITTEL & WEBBER 1973)

CONDITION	EXPLANATION	SANITATION ISSUES IN DSM
1. Lack of a unique problem statement	Multiple stakeholders have multiple perspectives on the problem resulting in lack of clarity regarding the nature of the problem.	There are different parts and zone in the city of DSM, needing different treatments and approaches. Nationally there are many stakeholders involved with sanitation and depending on where they stand, whether they are urban poor dwellers or from the municipality, their understanding of the issue varies. For the urban poor it might be that people do not care much about getting proper sanitation, or do not prioritise sanitation in their expenses, while local authorities are trying to push people to get better infrastructures as they see the urgent matter.
2. Conflicting objectives	Because success is generally determined in terms of objectives, any ambiguity in purpose leads to lack of clarity about successful outcomes.	The objective of the systems around sanitation (as implemented) is to sustain an insufficient water and sanitation supply (that only covers 20% of the city). While the urban poor want cheap solutions they can afford. For the UN the Tanzanian government needs 63% of the total population to have access to improved sanitation by the end of 2015. NGOs can't accept that authorities impose inadequate solutions onto communities and try instead to develop solutions adapted to local needs.
3 Conflicting values	Values determine the criteria by which success is to be judged, so any ambiguity in these criteria leads to lack of clarity about successful outcomes.	International institutions (UN, the World Bank) repeat the need for sustainable solutions in the global south, but Dar es Salaam's sole water and sanitation provider, DAWASCO (a private company), is implementing a system based on the need for water to flush the toilet and treats only a small part of the outputs of its sewage lines, discharging the rest into the Indian ocean. The UN repeats the need for governments to be involved but the sole provider in DSM is a private company.
4 Dynamic context	Static solutions do not work in a dynamic context where problems are changing or evolving.	If all DSM inhabitants get access to sanitation through the flush toilet and all the effluents are put out further downstream another problem is created elsewhere. The choice of a sanitation system needs to be carefully thought through and planned as a bad choice might shift the initial problem of water contamination only further downstream, away from direct contact with people but polluting the water elsewhere.
5 Scientific complexity and uncertainty	Uncertain or incomplete knowledge leads to inadequate basis for informing decisions.	It is not known whether all settlements in which toilets are being built will still be existing in the near future as the city expands and some settlements might need to be relocated because in too hazardous zones. The general lack of planning in DSM makes it very difficult to plan in the long term. The geological and environmental assessments of parts of the city are incomplete and lead to a restrained information about the conditions one is working in. DSM's last urban plan dates from 1979.
6 Political complexity and uncertainty	Ambiguity about political coalitions and power results in lack of clarity about which values should dominate and prevail.	The local NGO, CCI, I am collaborating with is often associated with the government in place as it is strongly involved in trying to improve people's direct living environments, which should be the government's role. When a government changes it has happened that they refuse to work with CCI for the simple reason that they think it is an entity related to the opposition's former government. At local level in the community-led sanitation improvement, a ward officer is directly involved in the community's activities to improve sanitation. A change in local power could have a direct impacts on the project and sanitation improvement activities. For example a new ward officer might not accept the use of dry toilet technology in his ward and refuse to let the community continue the activities.
7 Administrative complexity and uncertainty	Ambiguity about budgets and lack of procedural continuity results in inadequate implementation.	The actual project in which this thesis is happening is financed by the ministry of foreign affairs of Finland and the community is aware of the main aspects, as well as CCI. We know how many toilets can be built and with what money. The ambiguity might lie somewhere else though, for example at Municipal level or national level, where the budgets are much bigger and uncontrollable. Just as an example 90% of the budget allocated to sanitation in DSM goes to 20% of the city, namely the 20% that already has access to improved sanitation, the money is used to maintain the existing system.
8 Multiple tactics to address problems	Lack of clarity about the objectives and criteria for judging success result in lack of clarity about how best to proceed.	It is not clear yet what tactic the city of DSM is going for. There is no text that explains their preferred approach to tackle the lack of access to improved sanitation. It is not clear whether they are going to let communities work on their own areas, or whether DAWASCO will take over once the facilities are built or whether there is an actual plan...As seen above the last city plan dates from 1979.
9 Multiple stakeholders with the power to assert their values	Multiple stakeholders with multiple value sets and power structures lead to conflicting definitions of success.	Apart from DAWASCO as the supposed sole provider of water and sewage (providing 20% of the population) there are many other actors trying to increase the number of improved sanitation facilities. These are: Water aid, World bank, DAWASCO, local NGOs, local CBOs, all of them with different objectives and values. Each actor works in their own sector or area, geographical or of expertise. As there is no entity to really rely on or a common denominator the connections between all stakeholders is invisible and almost inexistant.

Table I.1, from Balint et al. 2011.

mix of cogitation and interaction" (GRIN AND HOPPE 2000, 180).

~ And even after 40 years of experience with wicked problems there is still no magic potion to help resolve their wickedness and although wicked problem's definition hasn't changed people have increasingly recognised the need to (BALINT ET AL. 2011): "**think of wicked problems in a holistic fashion**" which involves "having a **deep understanding** of the **context** and an **appreciation** for the **multiple perspectives, interests, attitudes**, and **values** that the **multiple stakeholders** bring to the decisions".

I. 2. 4. Multiple stakeholders

After establishing the status of wickedness of the sanitation problem in DSM, a common ground needs to be established between stakeholders. This can be done by establishing the complexity of the context and share it amongst the parties, as proposed by Balint et al. in the previous section. This can be done in various manners but needs constant communication and reminders on the complexity dealt with as well as the constant involvement of all parties.

But before one can engage in discussions, in order for decisions to be representative enough of the actual context's complexity, the stakeholders or actors need to be identified as well as possibly, their roles and perspectives, and their needs.

Furthermore what role can there be for planners or architects as stakeholders? Architects as citizens may be directly involved if the wicked problem concerns their direct environment or tickles their curiosity or civil engagement or they might be involved as "third parties". As will be shown in the following section I.3. Architects can play, have played and will continue to play a significant role in society by creating, dissolving, or participating in a mess. How as an architect do I go about participating in resolving a wicked problem or parts of it? How do I not participate in recreating undesired environments and where does understanding of a complex context come into play? How do I adapt my skills, means and visions to each and every specific context? Where do I stand in this mess and what could the actual impacts of an architectural intervention be?

The stakeholders and actors in the wicked problem of lack of sanitation in DSM:

The wider spectrum of stakeholders and actors involved in the wicked problem of lack of sanitation in DSM have been studied in the previous sections. In this section the focus is on the closer circle of stakeholders and actors around the community-led sanitation improvement project.

Stakeholders and roles in the community-led sanitation improvement project:

For this work's inquiry (see Part II), I am involved in the context of this "wicked" sanitation problem in DSM, through small scale architectural interventions in community-led sanitation improvement. My introduction to the "mess" (problem) happened through the local community, PHAST Ujenzi (PU), and the local NGO, CCI, and I am involved in the resolution of the problem as an exterior eye, a third party if you will (fig.6).

CCI is strategically working to empower communities, "federations" and consequently participates to making cities more inclusive for the urban poor. The set of stakeholders I am directly dealing with is an extract of the real world, as I am not directly involved with municipal or national institution.

I am not trying here to resolve the entire issue of lack of sanitation in DSM and its complexity but rather, with my own means, understanding, perspective, capacity and language, I choose to "lead by example", and "learn by doing" and use the successes, failures of my interventions as indicators of the possibility for alternative and more desirable sanitation solutions, that later on can be scaled up or used by other architects and or NGOs or even local and national authorities. If I was to put in words my encounter and ways of dealing with a wicked prob-

lem, I would say that it is about repeatedly making the effort to understand things and relations between stakeholders and different systems beyond their surface. It is about patience, communicating, common will and trust - none of these notions being taught in university.

The aim of the collaboration with PU is to find solutions together to their main challenges: lack of funds, expensive construction costs of toilets, challenges with existing toilet technologies, challenges to expand their activities.

PU is a savings group like there are many others in Tanzania and world wide. Through

the mobilisation of its members by CCI they became part of a large network of similar groups called federation groups, CCI plays the role of link between all these federation groups in Tanzania and the ones in the rest of the world. During an enumeration conducted by themselves with help of experts and CCI, they found out that sanitation was the main root problem for many issues in their area of Keko Machungwa. PU started sanitation activities, they have since been trained on hygiene and construction skills and they are all technicians, they all know how to build and maintain sanitation facilities: pour flush toilets, dry toilets. During the

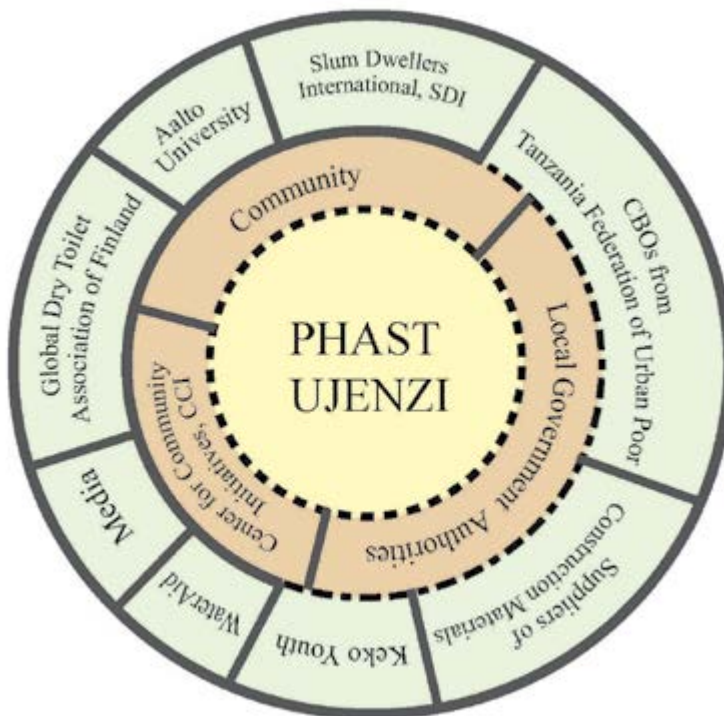


fig. 6. Stakeholder map and circles of influence in the community-led sanitation improvement project:
 “In the first level, I represent those stakeholders that relate directly with PU and whose influence on the group activities is high. The dashed line indicates the direct type of relationship that these actors have with PU. In the second level, stakeholders with less influence on PU are represented. Once again, the dashed line indicates the direct type of relationship. When line is not dotted, actors represented relate with PU through other stakeholders, so relationship is not direct”.
 (Guzman Figueroa 2015)

first visit in 2013 they had already built many improved facilities but needed some inspiration and impulse to continue to grow their activities.

The local NGO, CCI, is strategically working to counter the systematical exclusion of urban poor by empowering “federations” groups like PU. They are part of an international non-governmental organisation, SDI (Shack/Slum Dwellers International), that works as a platform for groups of the “federation” of urban poor and employs certain methods to help make cities more inclusive to those who are forgotten.

The collaboration with PU started with the idea of building the “*Phast Ujenzi Sanitation social enterprise*”, that would provide dry toilets (construction and maintenance) and sanitation education to their community but would also act as a community information centre for all hygiene and sanitation related

topics. The enterprise would be based on 7 main activities:

- construction of toilets
- maintenance
- collection and selling of fertilizers
- selling of vegetables grown with the fertilizers
- education of community
- training of other federation groups
- gardening

The project “*Sanitation improvement and social enterprise in Dar Es Salaam, Tanzania*” (fig. 7), is the framework that aims at achieving this enterprise. It lies on the strong foundation of CCI's support to PU and the pre-existing mappings, interventions (and trainings) that PU has implemented in their settlement Keko Machungwa (with the support of CCI). These were done with the intention to gather accurate and geo-localised data about their area, that would help them

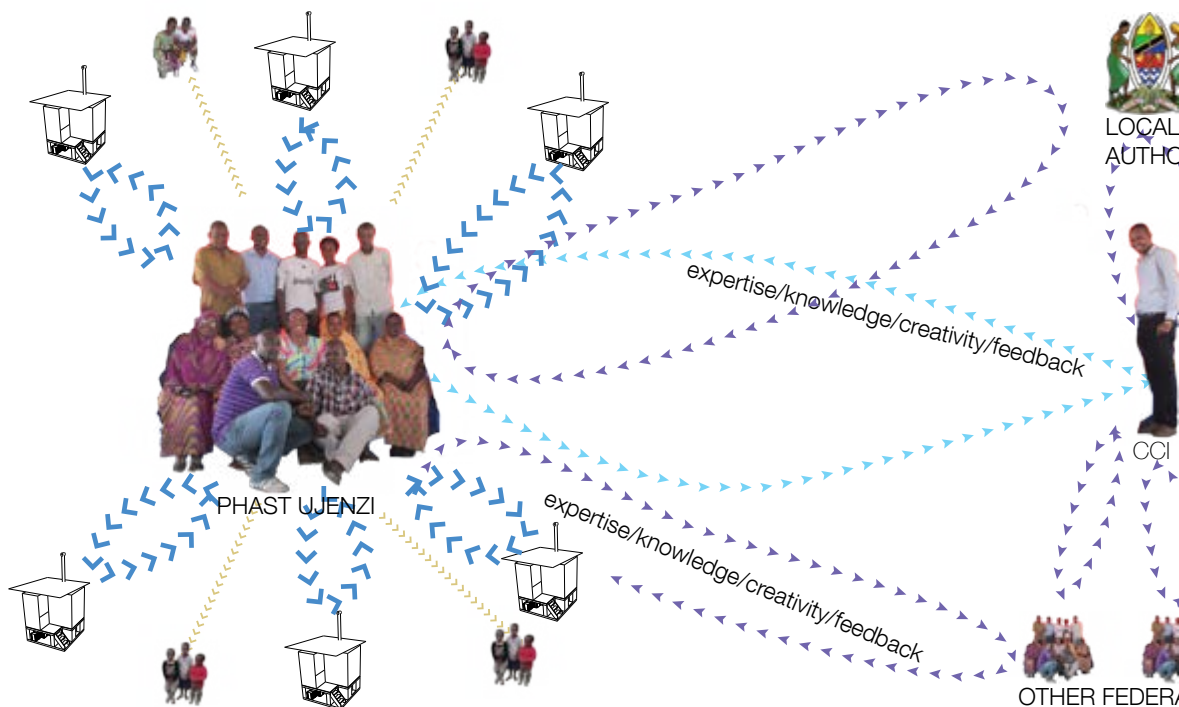
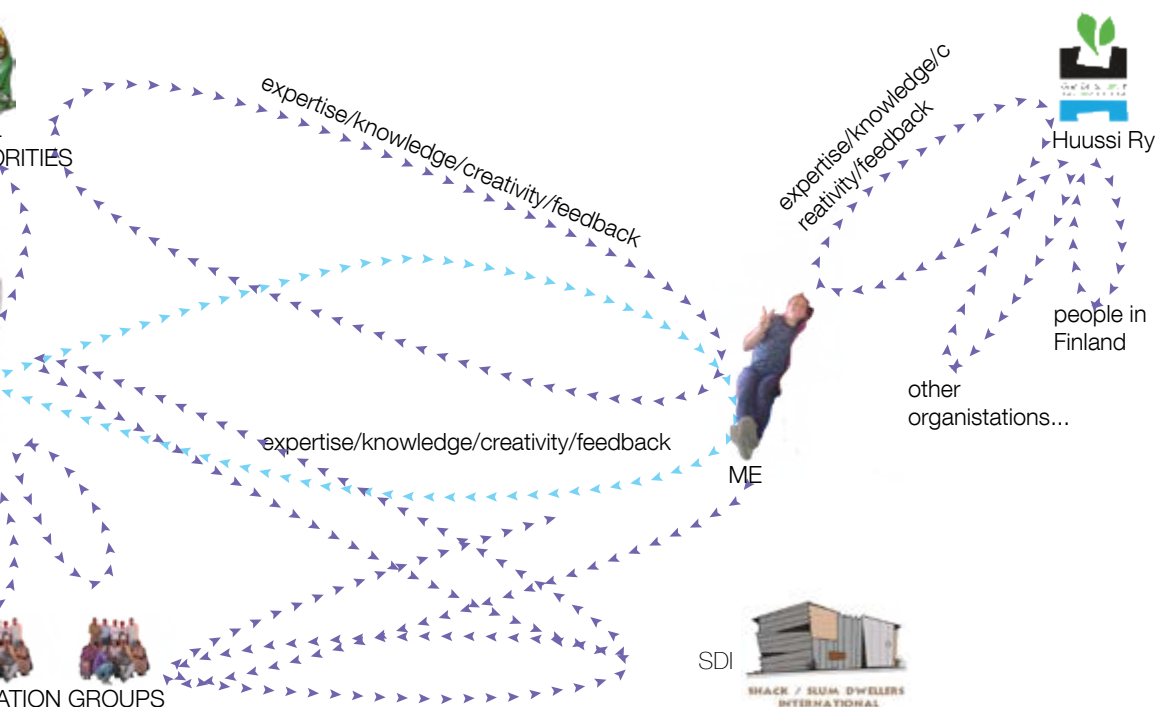


fig.7. Collaboration/cooperation/exchange/feedback diagram: In this project I work / cooperate / teach / learn from / collaborate directly with Creative Sustainability student at Aalto University.

understand the real situation and later an address the issues themselves or start negotiations with local authorities. The mappings and interventions are also part of a bed of methods CCI and “*federation*” groups use for different activities; from mobilising and facilitating the involvement of urban poor communities, to acting on the upgrading or improvement of their settlements.



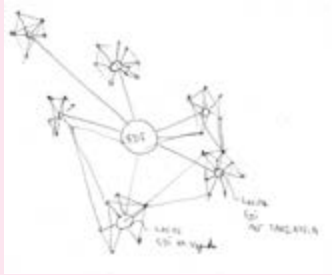
the community Phast Ujenzi and CCI, as a member of the Global Dry Toilet Association of Finland (GDTAF) and as an architecture and

WHO IS “SHACK/SLUM DWELLERS INTERNATIONAL (SDI)?

Shack/Slum Dwellers International (SDI) is a transnational NGO founded in 1996 and currently registered in South Africa and the Netherlands, with its member countries ranging across the continents of Africa, Asia and Latin America. It represents ‘federations’ of the urban poor and homeless groups who have organised themselves at a city or national level. In contrast to the prevalent post-war attitude of governments being best placed to deal with issues of poverty and development, SDI emphasises the need for the poor to be able to help themselves. They have developed a number of mechanisms or ‘rituals’ that facilitate this and which members have to adhere to. These focus on issues of governance and leadership with one of their key tactics being the encouragement of daily saving as a way to not only collect funds, but as a pretext for neighbourhood organisation. The daily interaction of people living in the same area under similar conditions encourages dialogue, raising opportunities to meet, discuss, and mobilise together. Although not only an organisation for women, SDI places a fundamental emphasis on their participation, contending that women’s involvement is crucial to the success of initiatives based around issues of household finance and housing needs. They also highlight that women’s movements have historically tended to be non-party political whilst effecting change on a social and political level.

THE WAY SDI IS ORGANISED:

Organised as a network, SDI’s pedagogical approach is based on horizontal exchange where members learn from each other’s experiences rather than relying on the detached and often inappropriate knowledge of ‘experts’. As members organise a savings group, gain land tenure regularisation, improve settlement infrastructure, or complete income generation and housing projects, they travel to other locations to meet those attempting to do the same. The growth of the SDI network increases its power and ability to influence governments and donors; the grass-roots organisation thus gains strength through numbers and is quickly becoming a large-scale social movement. It has recently become only the second NGO alongside Habitat for Humanity International to join the Cities Alliance, an organisation consisting of donor governments and the World Bank. Herein also lies a critique of SDI, which is seen to be aligning itself more and more with neo-liberal forces, and for some becoming the voice for the urban poor. Nonetheless, SDI have managed to create a space for local action and mobilisation at a time when governments and political parties have failed to act (SPATIAL AGENCY 2015).



SDI METHODS: Savings & Finance / Enumerations & Mapping (community planning) / Women / Partnerships / Slum Upgrading / Exchange and Learning



(SDI 2014)

WHO IS CENTRE FOR COMMUNITY INITIATIVES TANZANIA (CCI)?

It is a Dar Es Salaam based non-governmental organisation which was established in 2004 by Tanzanian professionals and is affiliated to SDI.

Its vision is to improve the quality of life of all Tanzania particularly women living in informal settlements by providing support to savings and credits, land and shelter, water and sanitation, HIV/AIDS. It is working with Federations of the urban poor, like Phast Ujenzi, that act as the basis for communities to plan and negotiate slum improvement schemes. CCI uses methods from SDI like settlement profiles and enumerations (socio economic survey), which forms the basis for project need assessment and planning (CCI 2014).

I. 2. 5. Leverage points in the system

In this work I opted for small scale interventions that could potentially have greater impacts on the lack of sanitation, at city scale, than the actual physical scale of the intervention. I not only make use of the physical properties of the interventions but also of the time and repetitions in the actions, as well as education and knowledge sharing. The core of the intervention, “A Pilot Toilet” (see PART II for the proposal of “A Pilot toilet”), which - in short - consists in a private to semi-private sanitation facility using dry toilet technology with urine diversion, which is a safe, affordable and well adapted system (see glossary) for the various reasons explained in PART II of this thesis.

This intervention is something that in the language of systems thinking is called a “leverage point”. Leverage points are “places in the system where a small change could lead to a large shift in behaviour” - as Donella Meadows started describing in *Thinking in Systems: A Primer* - or ways to “change the structure of systems to produce more of what we want and less of that which is undesirable” (MEADOWS 2008).

The power to add, change, evolve, or self-organize system structure:

The key before intervening and during the intervention was to find out what was desirable in the given context and what would help it spread to finally, as a result, change the system or “resolve” the wicked problem. Realistically this intervention is a tiny step within a larger strategy engaged by CCI in DSM, that drives to change the existing societal system at large (see description of SDI p. 38).

PLACES TO INTERVENE IN A SYSTEM

(in increasing order of effectiveness)

12. Constants, parameters, numbers (such as subsidies, taxes, standards).
11. The sizes of buffers and other stabilizing stocks, relative to their flows.
10. The structure of material stocks and flows (such as transport networks, population age structures).
9. The lengths of delays, relative to the rate of system change.
8. The strength of negative feedback loops, relative to the impacts they are trying to correct against.
7. The gain around driving positive feedback loops.
6. The structure of information flows (who does and does not have access to information).
5. The rules of the system (such as incentives, punishments, constraints).
4. The power to add, change, evolve, or self-organize system structure.
3. The goals of the system.
2. The mindset or paradigm out of which the system — its goals, structure, rules, delays, parameters arises.
1. The power to transcend paradigms.

The leverage point I think we are talking about here is number four in Donella Meadows' list on places to intervene in a system, it is called (MEADOWS 1999): "The power to add, change, evolve, or self-organize system structure."

As explained above my intervention is happening within a larger strategy developed by an international organisation, SDI, which has affiliated NGOs all over the global south. The local NGOs, like CCI, are directly in contact with local federation groups, which they mobilise and support. There are thousands of people and hundreds of communities worldwide, which are all in turn connected directly to each other through a variety of methods i.e. meetings and exchange visits, as well as through the sharing of common values and these same methods.

The organisation is a horizontal network made of elements that are directly connected in many points, some more some less. It has common values and common methods and is driving towards a common goal arising from the urban poor's needs rather than from a national or institutional need, although it could be argued that the need arose from global needs and are pushed by an international institution, for example the interests of the World Bank. Nevertheless the methods and activities of these groups, the way the organisation works as an equalitarian, horizontal, non-hierarchical platform for knowledge sharing, are the behaviours that define the system's purpose (MEADOWS 2008), and what impacts the "federations' " lives.

"The most stunning thing living systems and some social systems can do is to change themselves utterly by creating whole new structures and behaviours" (MEADOWS 1999).

I believe that SDI and the federations are doing exactly that. The way they are organised in a horizontal manner, sharing knowledge between every level, putting aside hierarchies and other social rules dictated by local and national governments, is in many ways in contradiction with national and municipal structures, that might have similar goals but differ in their ways of implementing them.

SDI and the federation groups are global, and their interaction predominantly based on cooperation rather than competition. They are highly interconnected and continuously involve communities from informal settlements rather than excluding them.

The question here, once the potential impacts and value of the intervention are established is how to communicate about these interventions and their actors to the larger context to enable a systemic change? Obviously in a slum context it makes really good sense to scale up the number of improved sanitation facilities. But the tricky question is always how? And lastly can that "how" be shared and valued commonly by all stakeholders in order to resolve a wicked problem at hand. In the videos by Tom Valente on *Diffusion of Innovations* he gives the example of farmers adopting hybrid corn seeds and remarks that when the farmers first tested the hybrid seeds they didn't plant the seeds on their full plot but on maybe 20%. They were so to say running their own tests. It seems like a crucial point when experimenting is to let people test by themselves and let people see for themselves, to allow - if successful - a repetition, reproduction and diffusion.



I. 3. THE ARCHITECT AND SOCIETY

In the previous section we only start examining the stakeholders (actors, agents) involved in the process of improving sanitation in DSM, and their connections, their roles, but also to some extent their purposes. Architects, planners, experts have a clear role to play in participating in such an action, but what is that role and what is it made of?

Little is known, taught in schools, or theorised on architecture and participation, on how to plan and involve communities as an architect. Extensive literature can be found from the Design discipline, which few decades (?) ago recognised the limits of an object- or end-product focused practice. Design activism, design thinking, all are methods, theories and movements that are increasingly looking at processes and reasons behind the doing of design, approaches that have recognised the growing need for “new” ways to respond to the current challenges of a rapidly changing world. In the case of architecture, the idea, though already discussed in the end of the 60s and 70s hasn’t made much way into architectural teaching and theory.

The most relevant and influential written piece on architecture and participation and at the same time the social role of the architect was written in 1969 by Giancarlo De Carlo in *Architecture’s public*; about “participation” as a primer to user involvement in the shaping of the built environment. He wrote *Architecture’s public* at a time where society was going through a transitional period from a controlling society to a more open and democratic society where the role of authorities was strongly put into question. Both in his writings and architectural works he gives

“permanent attention to the human dimension of architecture” (translated from McKEAN 2004, 10) and the author to continue,

“the positioning of De Carlo responds to the economy of a truly “participative” architecture. Participation, more than a social model or a principle, defines the materiality of a shared time, a present time shared, of the reality of a situation”.

After more than 40 years Jeremy Till, a scholar from the University of Sheffield, in his coedited book *Architecture and participation* tries to elaborate a portrait of what participation can be, should and shouldn’t be, in relation to the architectural practice. Reminding us that even if participation in architecture might not always be what it seems it is more than relevant for architects to explore and think of participation as a advantage rather than a burden, that through participation in its most ideal form, which he calls “transformative participation”, the architect becomes citizen and gains a different and enriching perspective on things. What are the opportunities for architects in helping to shape a more just and desirable future by involving communities? What are some of the processes engaged in doing so?

I. 3. 1. Architecture and participation

Doing architecture like any other planning act as Rittel states in his co-written work *Dilemmas in a General Theory of Planning* (1973) is a wicked problem. There is no true-or-false solution to a task given but rather a good-or-bad. For De Carlo what he calls “collective participation” is a way to “introduce[s] a plurality of objectives and actions whose outcomes can not be foreseen” (1969) just like wicked problems. Only once you have started dealing with a wicked problem can you start understanding it. De Carlo insists on the difference between doing architecture “with” and doing architecture “for”. Where doing architecture “with” is a way to

“expos[e] and acknowledge th[e rights of users] to have things and their rights to express themselves; it means provoking a direct participation and measuring oneself with all the subversive consequences that this implies; it means questioning all the traditional value systems which, since they were built on non-participation, must be revised or replaced when participation becomes part of the process, unleashing energies that have not yet been explored” (DE CARLO 1969).

Transformative participation:

The architect’s social and political role is undebatable as the act of doing architecture is affecting people’s lives. But why is it that architects tend to be repulsed by the idea of participation? For Blundell et al. in architecture and participation they explain that

participation represents a threat to normative architecture. Because participation brings forward the moment of reality, the moment when the tension between “ideals and reality of architectural practice” meet. The ideals of a normative practice and the reality of a clients needs and aspirations. Their solution to avoid seeing participation as a “threat” is to see participation as an opportunity, “a process that is transformative for all parties: the architect and the citizen.

The expert-citizen citizen-expert:

“I think that it is very important, because participation doesn’t really mean that users/citizens exactly tell how it has to look like but rather how it has to work. They have to give the information: “What do I want”, the functions [...] But we are the architects and they are still involved in the building process and giving a basic idea of what it should be about.” (see interview to Peter Fattinger in Appendix 4). This notion that participation of users means that the users becomes the expert is a misconception of what participation is. Participation goes both ways. The architect has an opportunity to become the citizen to a certain extent or at least to understand the citizen, and the citizen becomes expert in its own right as an expert of his own environment and needs. The exchange that happens through participation does not undermine the role of the architect, his/her role does not “become obsolete” (SANDERS & STAPPERS 2012), “a user can never fully replace a[n] [architect] as [architects] are trained and experienced in doing architecture, which requires a set of skills that can “never be out-sourced”. What will happen is that the profession will change as this type of practice requires a new set of skills for facilitation for example. This shift has already happened partly in the field of design for ex-

ample where the recognition of the practice of design thinking as a method for facilitating co-creation has been practiced for many years already. (SANDERS & STAPPERS 2012).

The need to transform and evolve in the way we do architecture:

Transforming and evolving a practice is essential to avoid stagnation and death. By adding new ways of doing architecture we ensure that the discipline itself will continue. De Carlo says in his *Architecture's Public* that "the intrinsic aggressiveness of architecture and the forced passivity of the user must dissolve in a condition of creative and decisional equivalence [...] where each is the architect, and every architectural event - regardless of who conceives it and carries it out - is considered architecture."

Precisely this change in mindset of the architect needs to happen for new evolved forms to emerge. In this way perpetuate a discipline. Analogically the same way cells of an embryo develop through epigenesis, which is the process of gradual diversification and differentiation of tissue from an initially undifferentiated entity.

Similarly to the period De Carlo was living in - a time of questioning and radical societal changes forced by radical political shifts and actions, we are standing at a point in history that tickles this need for change and transformation. First of all we need to respond to the global need for less harmful behaviours, and secondly because it is our purpose as a specie to evolve and transform through innovation.

I. 3. 2. The architect and other stakeholders

Thinking about the architect's role in society and its possible impacts when involved in resolving wicked problems does not go without thinking of the society itself or other actors involved in the same processes or potentially acting towards the same goals.

Spatial Agency:

After giving a portrayal of the complex context and methods of understanding these problems I introduce here practices or attitudes that give answers or alternatives to sometimes traditional and obsolete ways of working.

The notion "spatial agency" was coined by Nishat Awan, Tatjana Schneider, & Jeremy Till in their eponymous book, *Spatial Agency - Other Ways of Practicing architecture*, in 2013. The terms combined describe a common attitude or consciousness of the multiple agents (from the term agency that is explained below), and their actions, which have been compiled in their book.

For them "spatial agency" is the combination of the need for the transformation of space, from a subject strictly reserved to experts and specialists, to the idea that "(social) space is a (social) product" - as it was summarised by Henri Lefebvre in *The production of space* (HENRI LEFEBVRE 1974 CITED IN AWAN ET AL. 2013). Consequently placing space in a much broader social context (AWAN ET AL. 2013). Space and its production as an inherently political thing, contains the dynamics of "power/empowerment, interaction/isolation, control/freedom" (AWAN ET AL. 2013) which call for this certain consciousness of the agent or the agency - as an action or deci-

sion not to act (GIDDENS 1984 CITED BY AWAN 2013). By consciousness is meant the duality of space and its production, or what Awan et al. call agency.

Agency, they say has been only recently introduced into architectural discourse in two recent publications in 2009 (by Kenny Cupers and Florian Kossak in their respective publications, see references), but has a long history in social and political theory. For them, agents are:

“neither completely free as individuals, nor are they completely trapped by structure [to be understood here as societal structures]. Spatial agents are neither impotent nor all powerful: they are negotiators of existing conditions in order to partially reform them.”

and that

“Spatial agency implies that action to engage transformatively with structure is possible, but will only be effective if one is alert to the constraints and opportunities that the structure presents” (AWAN 2013).

In other words “action depends on the capability of the individual to ‘make a difference’ to a pre-existing state of affairs or course of events” (GIDDENS 1984).

Agency is also to be linked with empowerment as the “agent is the one who effects change through the empowerment of others allowing them to engage in their spatial environments in ways previously unknown or unavailable to them, opening up new freedoms and potentials as a result of reconfigured social space” (AWAN 2013).

Lastly, as introduced above, agency for Awan et al. (2013), works in tandem with the

temporality (intrinsic to the notion of social space as constantly moving and changing) of “spatial production”, because the agent, in being alert of the “coming wants and needs of others”, and I would add, present and past - as future is created in both present and past -, is able to “project visions and solutions into a certain future”.

In this regard to the notion of spatial agency, the previous sections on wicked problems resolution and defining the stakeholders and their roles as well as the potential for the action proposed in Part II, does seem to be valid. The action itself tells more about the opportunities and constraints of the specific context.

Small changes big impacts and the architect as curator:

In his book *Small Change* Nabeel Hamdi describes the importance of informality and the bottom-up effect for large scale changes (HAMDI 2004 REFERENCED IN AWAN 2013).

Showing through some examples that the smallest changes i.e. installation of a bus stop resulting in a group of people waiting can cause many more changes such as the installation of a street light (HAMDI 2004 CITED IN AWAN 2013). He looks for ways to use his own skills as an architect to add onto existing structures, the same way that the practice in Part II adds onto PU's existing knowledge practices and history (see Part II), adding value or making small changes rather than imposing new structures or leading the process as an outsider.

In a similar manner but with differing terms Diona Petrescu in her text *Losing control, keeping desire* published in *Architecture and Participation* (BLUNDELL JONES ET AL. 2005) talks about the architect as an urban curator, acting as a “mediator” rather than a “mas-

ter". Urban curating a term coined by Meike Schalk in 2007, is a term that in the same way as Hamdi described in *Small change*, defines an alternative role for the architect as a "curator that draws on other's creativity" (PETRESCU IN BLUNDELL JONES 2005) or with Schalks own words: "a person who scans and lays out a new field by making new readings of 'things', which s/he identifies and contextualises" (SHALK 2007).

In the light of this knowledge it is for each individual practitioner to create their own methods and skills to fit the contexts in which they work, being alert and aware of the changes and connections of things as well as the potential impacts of ones actions.

I. 3. 3. A dialogue with architects

I start a dialogue with practicing architects to first discuss about how they might position themselves in a fast changing society and world at large. Also to understand what subjects are important to them in the way they practice architecture, and how their projects might portray their personal engagements and understandings of their social role. At the same time I try to understand what makes their works different from a more common architectural practice, and what methods or ideas lay beyond the final architectural objects and results. During the discussions I steered the conversation towards the following questions: What ideas build their architecture? How might architects position themselves in society? How do they see their roles in the rapidly changing world? What is it they want to contribute to?

Peter Fattinger, IS TEACHING THE DESIGN-BUILD STUDIO AT THE TU VIENNA DEPARTMENT OF HOUSING AND DESIGN. HE IS ALSO ACTIVE IN HIS OWN OFFICE FATTINGER ORSO ARCHITEKTUR, IN VIENNA.



Fattinger Orso

His work is rather small scale, intensely



Michael Nagl



Peter Fattinger



Peter Fattinger



Peter Fattinger

involves citizens, non citizens, students and users as actors of his own projects, but also the projects of the studio he teaches at the TU Wien, the Design-Build studio. In this interview I am asking him about some of the reasons for his works and possible goals or critiques/visions that might be imbedded in it. As the interview goes on it becomes a rather informal discussion on his current and previous projects, concentrating especially on the "Design-build studio" that he started a decade ago at the TU Wien.

PF: I think it is very important to take your time while studying, to work while studying, not only in architecture offices but anything [...]. It's very important to get all kinds of different inputs, even working behind a bar. Because then everything relates to everything, if you just go to school and study, it's not grounded somehow.

- The buildings, the architecture should always allow people to discover something from the inside that you could not find out without going through the building. Also by involving the students in the project, so they are there, it's not just a sculpture that you just leave and people use and make whatever they want but there is quite a strong presence of us and also of the students who try to communicate about the project and try to tell what it is about. You can't just leave it on its own. There always has to be someone there, who is cooking, it's also very important with these projects.

- What is very important about

this Design.Build Studio is that it's a team work, not like a competition where single teams are working against each other. Here the teams are developing different variations and suggestions which are then discussed as a whole big team. We decide which approach to develop further and what ideas to leave behind. Later on they split up in teams of two to three people each, work on different suggestions, we then again as big team find out which way to develop then they have to stick to the idea until we meet next week again then still do different versions. It is very important that everybody is really involved, works together and discusses together. It's also interesting that some people are more silent in the design process but they are very good in discussing the project so they are not really very much drawing but they are putting their part in the discussion.

ZF: It's very interesting because you use different layers of people's abilities.

- Exactly, usually when you do a studio on your own there isn't really a discussion with the other students but much more with the teacher so of course these discussions take a lot of time.

Saija Hollmén, IS A TEACHER OF PUBLIC BUILDING DESIGN AT AALTO UNIVERSITY DEPARTMENT OF ARCHITECTURE. SHE IS



Olli-Pekka Orpo

ONE OF THE MEMBERS OF HOLLMEN REUTER SANDMAN ARCHITECTS WHO FOUNDED UKUMBI NGO IN 2007.

At the base of her work and Ukumbi's lies a great attention to philosophical choices. These profoundly philosophical choices are combined with a sensible approach to adapt to and understand habits and cultures of communities they work with.

Saija Hollmén envisions architecture as a foundation discipline that "invites" other disciplines, like science as a broad concept might be the foundation or mother of other disciplines and ways of thinking. Maybe what architecture is, is a flex, a process undergoing constant change. It really seems up to ones subjectivity and experience to define what architecture is.

SH: "The quality of architecture is important, the quality of the environment for everyone. I think it is kind of human right. Design ought to be for everyone, regardless of your social or economic status. The less you can pay for it the more you actually need it. It has effects on equality and so many issues in the society if the envi-

ronment is being taken care of, is being cared for. It becomes safer. Poverty has so many different aspects to it, and if you, as a designer are able to affect that, are able to create a better environment, it's likely to have a snowball effect and it will facilitate other things, it will invite other good things to the lives of these people. You need other disciplines also to create these economical and social possibilities."

- The common vision is the core. The whole project is always outlined according to the actual needs the community has. We become careful with choosing the partners we work with, because it's important to find NGOs or communities that are organised enough, who are very rooted in the community and working on the grass root level. If you can't commit yourself for 7 years to work with a community you have to collaborate with people who can. You have to collaborate with people who are rooted in the environment, it does not necessarily have to be architects, it might be a local NGO, local people who are rooted and become your link to the societies and the communities and their needs and aspirations and sort of facilitate your work of facilitating the community's. It's a true collaboration, a discussion and communication. The principles we have with UKUMBI and the needs and aspirations of the community need to meet in order to make a meaningful project.



Juha Ilonen



Juha Ilonen



Helena Sandman

MARCH 2013



APRIL 2014



JULY 2014



PART II. PRACTICE OF THE “PILOT TOILET” PROJECT

ARCHITECTS/ARCHITECTURE IN COMMUNITY-LED SANITATION IMPROVEMENT PROJECTS?

The “Pilot Toilet” project, practical inquiry of this work exposes a one year process during which I explore various methods and processes of doing architecture in the context of community-led sanitation improvement in an informal settlement of Dar es Salaam, Tanzania. The inquiry consists in the construction, use and reproduction of the “Pilot”, a semi private Ecosan toilet. The whole inquiry is a stand alone performative research method (see methods p. xiii) and is reported on and analysed with help of observations, evaluations, photos, interviews, and monitoring of the implementation, use and replication phases. The goal of the practice is to learn from performing; both to reveal the possible roles and opportunities for architects to play in participating with engaged communities in the creation of a more just and needed built environment; in this particular case the improvement of sanitation in an informal settlement, and to start formulating methods and/or processes that can be built upon and applied on the field by others (architects, NGOs, CBOs, citizens).

WHAT ARE THE OPPORTUNITIES FOR

II. 1. THE “PILOT TOILET”: IMPLEMENTATION PRO- CESS, METHODS AND APPROACHES

In this part I focus on the methods, the processes and approaches chosen for the different phases of the practice (see phases below and fig. 9 p.57). The methods and approaches give an understanding of how the community was included, and how I was working with the community. Each phase has its specific approaches and methods but all are informed by ideas and theories enunciated in Part I.

II. 1. 1. Background + time-frame

The idea of the “Pilot toilet” dates back to February-March 2013, when I was involved in the multidisciplinary studio course *City in Transition*, from Aalto University in Helsinki, Finland. A field trip to DSM, was organised and multidisciplinary groups of students were formed to work with groups from the Tanzania Federation of the Urban Poor (TFUP), on different challenges. Four students - including myself - and CCI, worked together with PU, to find ideas that could respond to the challenges faced by the group in implementing and developing their sanitation activities, in the area of Keko Machungwa, an informal settlement of DSM.

THESIS INQUIRY

PERIOD:

January-May 2013 (before the inquiry period):

Approaching the community,
Finding strength, Common
vision, Participatory plan-
ning

“A PILOT TOILET”:

Phase one, 12.2013-

04.2014: Prepare

Research
Plan
Design

Phase two, 04.2014-

05.2014: Build

Build the “Pilot” + learn by
doing
Participatory planning

Educate

Build capacity, Train

Re-Draw

Monitor

Phase three, 05.2014-

07.2014: Inaugurate

Use

Add

Inaugurate the “Pilot”

Monitor

OUTCOMES:

Phase four, 08.2014-

03.2015: Reproduce

Use “Pilot”

Reproduce (construction of
household toilets)

Monitor “Pilot”

Evaluate “Pilot”

II. 1. 1. 1. Approaching the community

This phase happened in 2013 during the studio course *City in Transition*. One year, approximately, before to the beginning of this thesis work, but as it contributed a lot to creating a strong basis for the inquiry I thought it important to integrate it to the work as a method and part of the overall approaches.

Creating links:

In this phase it was important to find out about the community's needs, challenges, strengths, weaknesses. Consequently the approach was very human centered and focused on the community, their work related to sanitation, exchange, discovering the way they worked. It was about starting a relation with the community.

The first meeting with PU remains one of the warmest and strongest memories of this collaboration. As we arrived on the top floor of Dealer's Pub - a local bar open to the winds and with one of the best views over Keko Machungwa - the women (mainly) that constituted PU group welcomed us with a song,

that we later learned by heart. We all felt very welcome and already accepted. From the start the communication and effort to mutual understanding was the base for the cooperation. With CCI's and the translator's help a bond was quickly created with the women and men of PU.

Finding strengths:

Husna the group leader is for much in this successful partnership; her efforts and motivation and clear leadership role were crucial to create a link between us as strangers and some of the more discrete members of the group. She is not only member of PU but also leading the city wide community enumerations that might enable community upgrading in the future. She knows most of the informal settlements in DSM and knows most of the active members of the TFUP groups in DSM. Consequently she is also very aware of the wider challenges the city is facing but also aware of local challenges of her own area Keko Machungwa and her input.



fig. 8 . 2013 common vision: The first plan for the “sanitation enterprise” (2013) drawn together with PU, it lists the main activities needed for PU's sanitation activities to turn into a sanitation sustainable social enterprise; you can already see the Pilot idea enunciated. Until today this plan has remained as the common vision for all project activities and project actors.

Building a common vision:

While struggling with both internal and external challenges to grow the activities, PU was mainly facing external issues, such as the high cost of construction (especially of dry toilets). It seemed evident at the time that trying to reduce the cost of construction (a dry toilet in 2013 cost circa. 1 000 000 Tsh = 500€, when most slum dwellers in DSM earn between 5 000 and 15 000 Tsh/day) was a crucial factor for them to find new clients, and that working with locally sourced materials or cheaper building techniques could help reduce the costs.

Together with PU we were able to identify a few issues: the flooding in the area, the unhygienic practices of the population, the high contamination risks through un-improved sanitation facilities, the collapsing of traditional pits due to the bad soil conditions...

Through multiple exchanges in form of interactive workshops and informal discussions and walks with PU we were able to make a plan, within which the idea of the “Pilot” emerged (fig. 8).

The vision was to start a sanitation enterprise based on the construction of dry toilets in Keko Machungwa and the selling of fertilizers that would be collected from these toilets. These activities could grow into a social enterprise and would bring income to the group and also enable to support the sanitation activities in the long term.

PU's existing achievements and visible motivation made it clear for all of us that if this plan was to go further there was a need for a concrete time and place for the launching of the vision, and that was “A Pilot toilet”.

Through the Pilot we would be able to test the many different components of the future enterprise: the urine and compost, the growing of vegetables, construction related

matters - namely the use of alternative materials that would allow a cost reduction of construction.

The original timeline was not kept but the idea of a “Pilot” stayed and became an integral part of the “Sanitation Improvement and Social Enterprise” project and was built in spring 2014.

Timeframe:

The total period of inquiry for this thesis spans over approximately one year from February 2014 to March 2015.

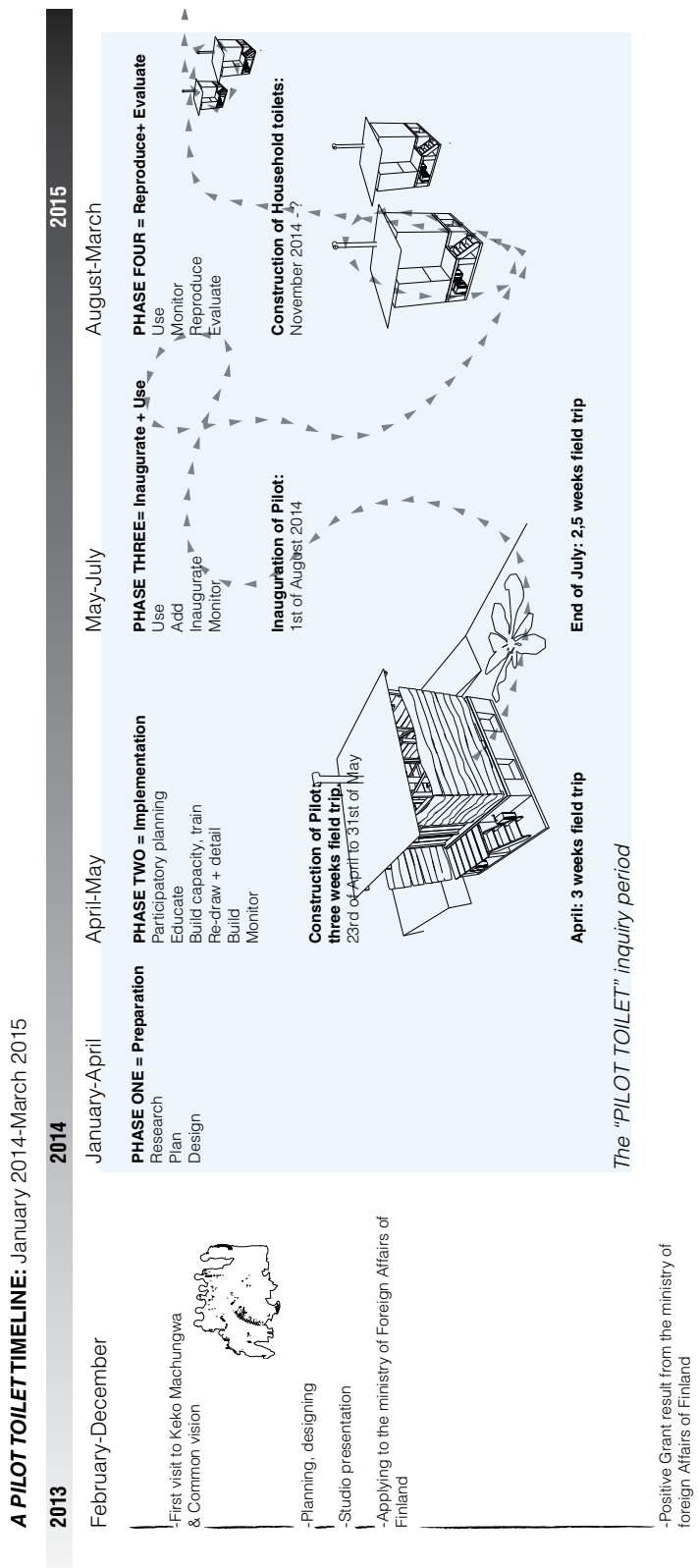


fig.9 Project inquiry period.

II. 1. 2. Choosing a sanitation system

As seen in Part II Dar es Salaam is both growing rapidly and lacking basic infrastructures. There has been little effective responses from national policies or municipal actions to bring adequate sanitation to a large section of the population. As a result Tanzania will not reach the Millennium development goal sanitation target which was to bring improved sanitation to 63% of its population by 2015. Instead, it is expected that only 31% of Tanzania's population will have access to improved sanitation facilities by the end of this year (WHO/UNICEF, JOINT MONITORING PROGRAMME FOR WATER SUPPLY AND SANITATION 2008). The UN, in its last report on urbanisation prospects from 2014 argues that "rapid and unplanned urban growth threatens sustainable development when the necessary infrastructure is not developed or when policies are not implemented to ensure that the benefits of city life are equitably shared.... In some cities, unplanned or inadequately managed urban expansion leads to rapid sprawl, pollution, and environmental degradation, together with unsustainable production and consumption patterns. Urbanization is integrally connected to the three pillars of sustainable development: economic development, social development and environmental protection" (UNITED NATIONS 2014). In this view the response to lack of sanitation needs to also consider environmental issues. Not only related to people's health but also the health of an ecosystem. On top of that "municipalities of the global south struggle to deal with the infrastructure and delivery needs and the level of growth of the cities make it very difficult to retrofit, and urban planning for settlements which are already established and developed in

such a chaotic manner is very challenging" (PARKINSON 2014).

Conventional sanitation concepts, based on flush toilets, a water wasting technology, are neither an ecological nor economical solution in both industrialized and developing countries (LANGERGRABER, MUELLEGGER 2005), as they require large and costly infrastructures local governments are not able to pay for. Whereas ecological sanitation solutions can give answers to both the sustainability challenges, cost issues and the adaptivity to community scale.

In the same manner Dr. Christoph Lüthi, Senior Scientist and urban planner at Eawag-Sandec, specialised in planning and design of urban infrastructure in middle and low-income countries recognises the very strong need for cities of the global south to focus on sustainably scaling up access to environmental sanitation services and infrastructures "because access to services is so low, and the public health imperative is so urgent" (LÜTHI, ET AL. 2011).

II. 1. 2. 1. What situation

DSM close-up:

80% of DSM relies on mainly traditional pit latrines. Those latrines are neither improved nor safe. They are just holes dug in the (unstable) ground with a concrete platform on top on which people squat. Often people do not request emptying services either because their houses are not reachable by the emptying trucks or because they do not have the resources to do so as this has to be done twice a year approximately. That is why as a result many people rely on the rainy seasons to empty their toilets into nature though there exist alternatives to these trucks, like the Gulper. Pit latrines, open

defecation or other unimproved sanitation facilities are hazardous solutions creating bigger issues, contaminating water sources and polluting water streams, getting people sick and further having bigger impacts on people's well being.

Climatic, Spatial, social, cultural, economic, context of Keko Machungwa:

Keko Machungwa, Keko ward, in Temeke Municipality, is situated between a police housing quarter, some industries, and is not far from the national football stadium. It lies on the one side of a valley with a small creek at its bottom. As one of the denser and oldest settlements of DSM (BRENNAN ET AL. 2007),

“Closer to town lay the venerable shanty settlement of Keko, which had provided accommodation for the urban poor since the town's early days, and re-

mained an important residential location in close proximity to the port, Kariakoo and the town centre...” (BRENNAN ET AL. 2007)

Keko Machungwa has its history closely linked to the one of its city. From the map, Keko Machungwa is a dense network of countless narrow pathways as large as a person, few larger streets, and densely built houses allowing some small openings, mixed with few trees and other vegetation forming a homogenous picture similar to the map of a Medieval mountain village but flattened out and without the protective walls. Its small scale and organic structure, differs in all ways from urban developments of the 19th and 20th century in Europe or the USA! Like other informal settlements of this kind its typology is the result of generations of agglutination and additive vernacular urbanism and architecture. The streets and houses



have been time after time placed, built and added to form a whole, a logical/coherent network.

At eye level Keko Machungwa is all the same, although its intricateness and labyrinthine structure are even more palpable - as one gets easily lost. Unlike other types of shanties built of scrap material, recovered cardboard pieces and metal sheets, the houses in Keko Machungwa are mostly built on the traditional Swahili house model using mostly cement blocks - often made in the very same settlement by some craftsmen. Most houses are one story high but there exist the few higher buildings serving principally public purposes, like churches, pubs.... Most houses have electricity, some have computers and all modern equipment (TV, HiFi).

Poverty is very visible, as well as the lack of

basic infrastructures (especially during the rainy seasons when most streets are flooded or when people open their pit latrines to be flushed out by the rain). The intricate network forms a coherence that connects all inhabitants and many other living things like the many chicken. Any product is available within a short distance walk or Tuk-tuk ride: pipes, furniture, food, phones, flip-flops... It's a city inside the city, a tiny biosphere full of life and resources, mango and banana trees, vegetables and leafy greens planted here and there among the concrete houses.

Mostly Keko Machungwa has no proper drainage system and during a settlement survey made by PU a few years ago it was found that 50% of Keko Machungwa's households did not have access to improved sanitation facilities. Most of them use pit latrines and some have no toilets at all. Dur-





ing the rainy seasons while the regular floods occur it is usual to witness the horrid smell of manure rising from the streets as people use the heavy rains to flush out their pits.

Keko is built on rather unstable ground like most of DSM, digging pits is dangerous and often results in collapsing toilets and shower pits. The water tables are high around 2 meters below the ground (in some parts just below the ground). Access to water is limited and costly although there has been clear ameliorations with the installation of public water points in a few places. The picture painted by Davis in Planet of Slums “most houses do not have running water and most inhabitants need to collect water from a nearby well and pay for it directly” presents the problem clearly meaning water like in many other areas of Dar es Salaam is a rare and costly amenity, so much that kids on the streets when seeing you with a bottle of water will almost every time ask you to give it to them.

II. 1. 2. 2. What approach?

There are many approaches when it comes to choosing the appropriate sanitation system for urban informal settlements. People involved with the subject agree that the approach should nevertheless be different from a classic top-down approach where the supplier of the service would impose the technology onto the community. In fact according to WHO “a major concern for expanding water-supply and sanitation services is to select technologies and institutional options that users would be willing to pay for, and that would also ensure good public health and sustainable environmental conditions (WHO & IRC 2003). It is for decision makers and planners to “identify the most appropriate technology for their situation, taking into

account the conditions in the project area”.

What does this mean? It means that each context demands adapted approaches. Approaches that take into account the needs and existing circumstances and accordingly adapts the various components constituting a sanitation system - from the user interface to the disposal or reuse (EAWAG/SANDEC 2008) - namely, the design (user interface), the technology, the operating and maintenance and the costs (monetary resources).

A sanitation system is generally made of the following components (fig.10): the user interface corresponding to what the user sees and uses, the collection and storage/treatment where the excreta is stored or treated before being sent for further use or treatment for example a septic tank, the conveyance which is the way the products are moved from the collection to the next treatment and the use or disposal which is the final stage of what happens to the product before becoming something else. Although not all of these processes are needed in for all technologies, all stages

require certain technologies that need to be designed appropriately. Here is where an architect, designer or any other planner's role is important.

II. 1. 2. 3. What should one be looking at when planning or designing a sanitation system?

There are several ways to go about choosing the right technology; table II.1 (WHO & IRC 2003) gives an example.

Once the data is collected “several criteria can help in the analysis of the data and in choosing the design of the sanitation system”, these are listed below (WHO & IRC 2003):

- ~ Match user preferences according to local capacities and environmental conditions, such as whether there is the risk of contaminating water sources. The preferences of all users should be considered, including men, women and children.

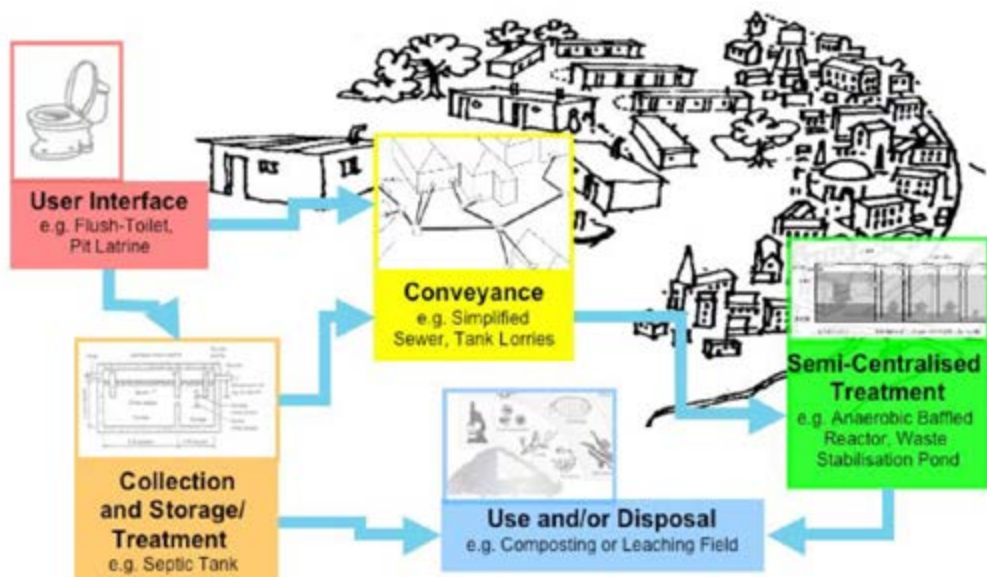


fig.10 (Eawag/Sandec, 2008)

Technical factors		data	Factors specifically relevant to Operation and maintenance	data
design preferences	floor slab	x	O & M requirements	
	superstructure	na	ease of access	difficult
	substructure	pit	use of decomposed waste	no
	squatting pan	x	pit emptying technique	gulper, trucks, vomiting
	seat			
technical standards and expected lifetime of technology		durable		
availability of construction materials		x		
cost of construction		500 euros max		
Environmental factors				
soil	texture	sand	O & M implications for environmental protection	yes
	permeability	high	protection against groundwater contamination	yes
	stability	low to very low	protection from flooding	yes
groundwater level		high (1-2m)		
control of environmental pollution		no		
availability of water		low		
possibility of flooding		high		
Institutional factors				
existing national/local strategies			pit emptying services (municipal/private)	private
roles and responsibilities of actors implied			sewerage maintenance capacity	no
training capacity		yes	potential involvement of the private sector	na
availability of subsidies and loans		yes	national budget allocations for sanitation	na
availability of	masons	yes	training and awareness education	yes
	carpenters	yes	monitoring	yes
	plumbers	na		
	sanitary workers	yes		
	pit-emptiers	yes		
	pit-diggers	yes		
Community factors				
Sociocultural aspects	taboos	na	O&M costs	should be as low as possible
	traditional habits	na	O&M training and awareness for sanitation	needed
	religious rules and regulations	na	health awareness and perception of benefits	needed
	cleansing material	water	presence of environmental sanitation committee	yes
	preferred posture	squatting	women's groups	yes
	attitude to human faeces	waste	social mobilization on hygiene and sanitation behaviour	yes
	gender-specific requirements	na		
motivational aspects	convenience	yes		
	comfort	not necessary		
	accessibility	yes		
	privacy	yes		
	status and prestige	no		
	health	yes		
	environmental cleanliness	yes		
	ownership	yes		
discouraging factors	darkness	yes		
	fear of falling in the hole	yes		
	or of the pit collapsing	yes		
	or of being seen from outside	yes		
	smells	yes		
	insect nuisance	yes		
social organisation factors	role of traditional leadership	no		
	religious leaders	no		
	schoolteachers	no		
	community-based health workers	na		
other factors	population densities	high		
	limited space for latrines	high		
	presence of communal latrines	not relevant		

Table II.1 (WHO & IRC 2003)

- ~ Match investment requirements to the costs of the technology and to the community's ability/willingness to pay.
- ~ Match community needs to the availability of materials.
- ~ Match the proposed design options to the availability of craftsmanship.
- ~ Match O&M requirements to the prevailing sanitation behaviour and to local capacities.
- ~ Identify promotional campaigns, micro-credit mechanisms and hygiene education programmes that could accompany the technology selection and installation process.

II. 1. 2. 4. Why Ecological Sanitation?

Choosing Ecological Sanitation over more traditional sanitation (for example the flush toilet), as an idea or set of concepts around one defining mindset, in general terms is a case of sensibility and awareness. But as we will see in these paragraphs like every complex choice to make it requires a bit of both rational and subjective criteria.

Principles:

There are many Ecological sanitation concepts (LANGERGRABER, MUELLEGGER 2005) and Ecological sanitation (EcoSan) defines rather the mindset or the system within which the different concepts are contained. The mindset is different from other sanitation systems essentially in the way that it recognises excreta (urine and faeces) as a resource rather than a waste. Most EcoSan (Ecological Sanitation) systems do not require large quantities of water. Excreta (faeces and

urine) are collected (together or separately) and can be treated (composted or stored) right on site or in a decentralised composting or storage place. Urine and composted faeces are great fertilizers or soil additives and can be used for gardening or farming. EcoSan systems are small scale and do not need large infrastructures.

Chosen technology for PU:

Planning, designing and later on managing environmental sanitation services in and for an informal settlement is an exercise that necessitates a good understanding of the general context, stakeholders, social, and cultural surroundings as well as urban dynamics, future plans and existing infrastructures, ecological and climatic conditions.

In the case of the Keko Machungwa community, there was an existing history of sanitation activities implemented by PU "federation". Understanding the context meant to carefully take into account the people that would implement the work, namely PU. The community was going to determine the scale of the work according to the height of their abilities and their training capacities.

Nevertheless the choice of the technology and nature of the system was decided in a mutual agreement with the community, through a few workshops, settlement visits, and informal discussions. The workshops and informal discussions helped understand their fears and expectations, existing work and challenges. As an example, during the process it was also found that PU had built dry toilets which was determining in communicating on a common understanding of the advantages of such a technology for their area. As they had previous knowledge on hygiene, construction and sanitation in gen-

eral it was easy to discuss the matters with them and come to an agreement of the best practice to choose for their settlement.

At the same time it was crucial to consider the environmental factors (climate, geology, soil composting, ecology of the place...).

These factors were very determining as Keko Machungwa area is prone to flooding (SAKIJEGE ET AL. 2012) and the water tables are very high, causing pit latrines and shower pits to collapse and water to infiltrate the latrines to go on and contaminate drink-

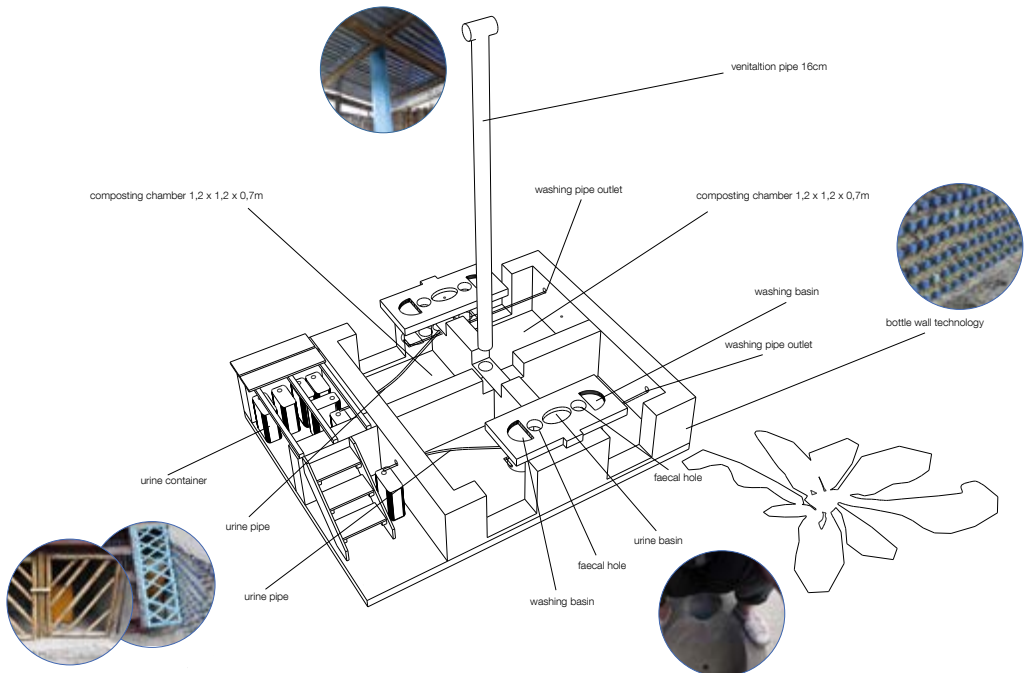


fig.11 Above the interface of the "Pilot toilet" (UDDT), where urine, faeces and washing water are separated, below the dehydrating vaults, urine and washing pipes and urine container storage space of the "Pilot Toilet".

ing water sources found locally like the water wells people use in every day. As seen in Part I also DSM suffers from a constant lack of water making it hard to introduce a system that would be based on the use of large amounts of water.

The resulting choice comes from the comparison of the data collected in Table II.1 to the various factors enunciated above. The approach is neither purely scientifically nor purely subjective. As wicked problem theory suggests, “there is not perfect solution” but I would add that a sensible approach is required to make sense of the context.

Urine Diverting Dry toilets (UDDT):

As explained previously there are many technologies within the EcoSan concept, one was filling all criteria regarding the local conditions and capacities of the community. With PU it was agreed to implement a

technology called, Urine diverting Dry Toilets (UDDT) with double dehydrating vaults, where urine and faeces are separated, thus allowing separate processing (fig.12), urine separation allows practical reuse of excreta and saves water, UDDTs can be built locally (EAWAG/SANDEC 2008). Urine contains large quantities of nitrogen (N), phosphorus (P), and potassium (K) (NPK) which are the main nutrients useful for plant fertilization and found in industrial fertilizers. Collecting and using urine can help diminish the need for mining of these useful nutrients in agriculture and PU can collect the urine and compost from users and sell it further to farmers or local community members for use in their garden. Separating urine from the faeces also allows to reduce the volume of the faecal chamber and in that way reduce the size of the chamber and toilet to be built.

UDDTs require a different user interface (fig.11) (what you see and use in a toilet)

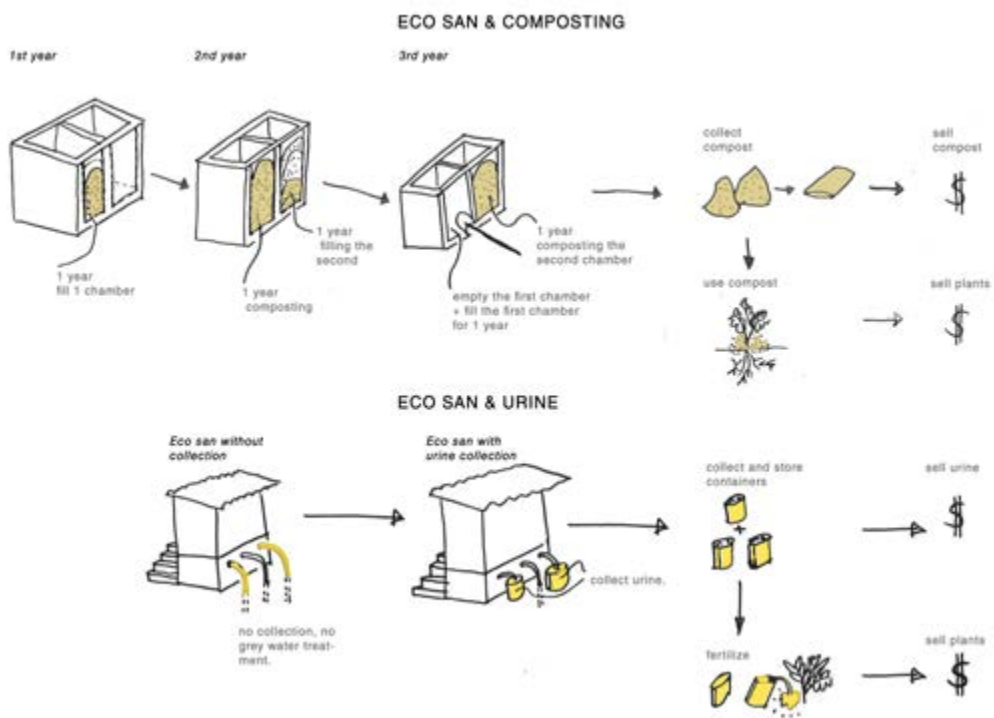


fig.12

from the classical flush toilet pan. There needs to be a hole for urine and one for faeces, also because we are in a region where people wash rather than wipe there's a need for a third hole for the washing is also required. Double dehydrating vault means one toilet is made of two chambers where only one is being used at once (fig.11). When the first vault is full (usually after a year) it is closed and the user changes side to use the second vault while the first one can compost for the time being. Once the second vault is full it is time to empty the first vault and use the compost on the plants or let it compost further (fig.12) (after a year the compost pile is safe to use).

Advantages and disadvantages of ECOSAN: UDDT

- + Emptying happens only once a year and the amount to be emptied is minimal compared to the amount from a pit latrine.
- + No large machine or vehicle is needed for emptying. (A person alone can easily empty and load the contents of a chamber onto a small vehicle)
- + No need for large infrastructures
- + Suitable in places with high water tables (which is the case is Dar es Salaam)
- + Allows reuse of human discharges (in this case as a fertilizing product to farmers)

- + Low maintenance costs (low long term costs)
- + Can be built on site with locally available materials
- + No need for water
- + Since faeces are dry and urine is separated, smells are minimal, though a lid should be used
- + Very inexpensive
- Its use may be difficult for some people (heavy, old and young)
- Faeces can be accidentally deposited in the urine section and lead to clogging and cleaning problems
- Urine pipes/fittings can become blocked with time.

Edited from Eawag/Sandec 2008.

II. 1. 3. The “Pilot” proposal

The proposal is in written form and was sent to CCI and PU prior to the start of the construction in March 2014. Its purpose was to set a common understanding of what was intended with the construction of the first EcoSan toilet of this type in Keko Machungwa.

II. 1. 3. 1. What is the “Pilot” about?

EXPERIMENT: Experiment, get feedback and update. When having the idea to test the feasibility of the business and toilet model, together with PU we decided for an experiment place and time as the “PILOT”. While continuing with their sanitation activities, PU would start testing the first dry toilet, producing urine and compost for their own garden.

The urine as fertiliser can then be tested on their own plants in the garden and the women and men can start familiarising themselves with the products of their enterprise. The testing could start shortly after the first urine containers have been filled and sterilized, aprox. one month. The *Pilot* also gives each party the opportunity to experiment new materials for the toilet construction: such as Bamboo, Makuti (coconut leaves), bottle-walls and more!

LEARN: Each person involved in “A Pilot Toilet” would have the opportunity to learn but also teach skills as well as get specific construction training. For the first toilet some new techniques such as bottle-walls and wood constructions will be used. PU will be provided handicraft specialists as facilitators and trainers that will teach some of their skills to PU. If PU members themselves want to teach some skills to other members that is

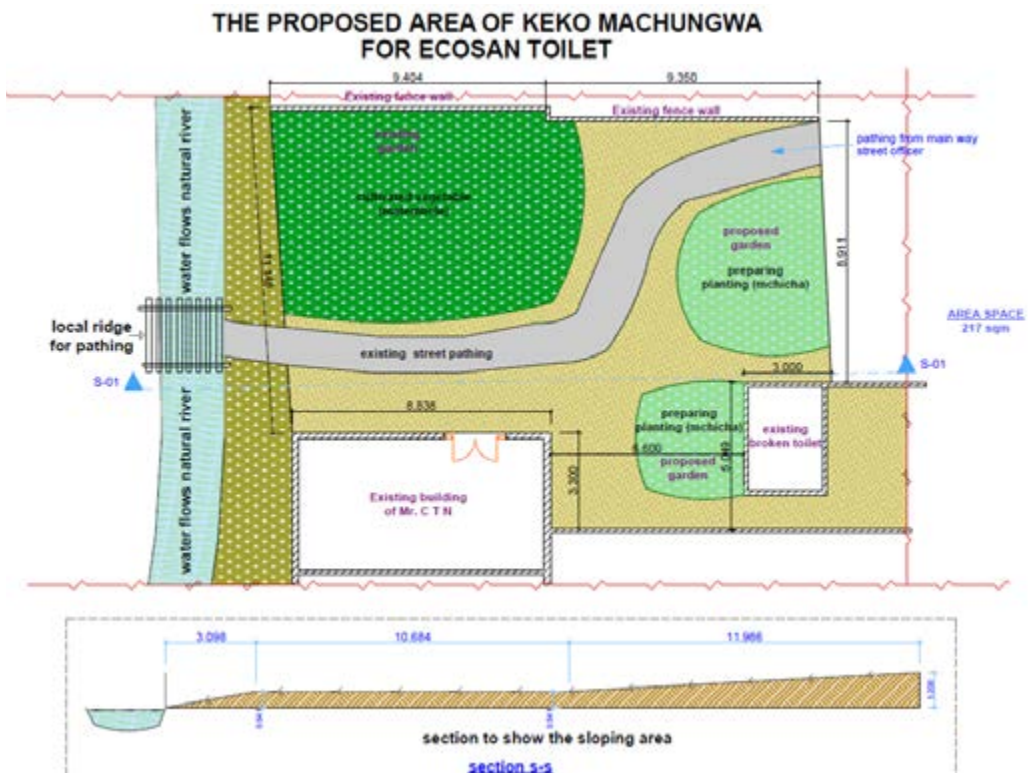


fig.13 Proposed garden plot for toilet and garden. No scale. Drawing by local architect.

also a possibility. Learning by doing.

SHARE: Share knowledge and experiences.

PU will be provided with tools and external people to enlarge their knowledge and extend their contacts while being given enough training and education for their empowerment. It will be the opportunity to let new ideas emerge for GD Taf, PU, CCI and Keko Youth, who are the beneficiaries of the “Pilot Toilet”.

II. 1. 3. 2. What are the “Pilot’s” goals?

The “Pilot” is the first step of a long journey for PU to build a self sustaining sustainable sanitation social enterprise. The aim is to give the first impulse to the future enterprise

in form of trainings (construction, handicraft, business and other skills), and education on sanitation. Through the trainings and education PU will acquire additional knowledge on building & planning the facilities as well as education on sanitation and skills for running an enterprise. Also it will be the opportunity to bring some new inspirations to PU and share ideas.

In addition, the goal of this “Pilot” is to test the feasibility of the toilet model and the sanitation enterprise. It will serve as a platform to get feedback and to improve and/or add all relevant activities for ensuring the success of the project.

Approaching the “Pilot” site and its inhabitants:

To access the site (fig.13) we enter from Kilwa road (which comes from the centre), through the Police’s residences, follow a bumpy dirt road to the heart of Keko Machungwa: the dealer’s pub on one of the main streets of Keko Machungwa. Once there we leave the car and we reach the site on foot for about 150 meters through narrow descending paths meanders in the settlement, sometimes through people’s backyards and we have to lean forward so we don’t take people’s laundry with us. The tiny shops, sporadically paving the way and selling few hungry looking vegetables, soda and necessary daily products, the rituals of daily greetings to strangers and people busy in front of their houses makes the few hundred meters a very lively daily experience and the enjoyment grows as we day after day, repeatedly pass by and start recognizing and being recognized by people!

Situated in Keko Machungwa at the limits with Keko Juu on the banks of a small creek, at the bottom of the valley on which Keko Machungwa is built. The Pilot site is approximately 280 m² with a light slope, there is one house and two toilets of about 4 m² each of which one has collapsed. The house hides a fish pond and a poultry space on its West side by the river. The pond’s water is directly connected with the river’s water. There is a 1,2 meter difference between the Western and eastern limits of the site. The water table is very high especially during the rainy season, where it is even visible. Vegetation is found by the river banks with mainly banana and coconut trees. Some green vegetables are planted on the site.

II. 1. 3. 3. How will the Pilot be implemented and by whom?

TIME: the Pilot will take place in April 2014 for 3 weeks.

PLACES: garden plot (fig. 13) for the construction and Dealer's Pub as meeting place for trainings and education on business and sanitation.

PEOPLE: PU, GDTAF (Zita Floret), CCI (Hezron Magambo and Pita Mtui).

ACTIVITIES: Construction trainings (or workshops) as the construction itself, ecological sanitation education, business training, creative workshops.

EXTRAS: at the end or the beginning of the construction, an event for the larger public will take place: presentation of the Pilot (opening of the construction process, laying of first block) or the newly built toilet.

WORK PLAN: The implementation of the "Pilot" will consist in a 3 week "workshop" led by Zita Floret (GDTAF) and CCI, in Keko Machungwa (DSM) where a dry toilet facility and a vegetable garden will be built, an awareness raising event on sanitation will take place and training will be given on business, construction skills as well as on dry sanitation.

The sanitation facility consists in a semi-public (to be defined) dry toilet (with shower, grey water treatment and water harvesting) and a garden (vegetable garden where the harvested water and natural fertilizers -urine and composted faeces- from the toilets will be used). The purpose is to test the idea and prototype of an improved sanitation facility using dry toilet technology in the context of Keko Machungwa, to further scale it to the rest of the Keko area and later (2015-2016)

other slum areas of DSM.

II. 1. 3. 4. Three focus areas

1. Planning and training: Before travelling to DSM for the Pilot workshop, all project activities will be carefully planned by GDTAF and CCI (pilot, event, and visual material such as brochures) and communicated to *PU* and CCI.

Once in DSM the sanitation facility, the garden, and the event will be further planned and prepared by *PU*, GDTAF, CCI and the leader of Keko Youth together in the context of participatory planning sessions. In this way all parties are involved in the decision making. In addition, *PU* will acquire all essential knowledge on dry sanitation, on the use of urine and compost as fertilizers and the relevant business knowledge to start running the sanitation social enterprise through training sessions given by local experts CCI and Zita Floret.

2. Construction of Pilot: the construction of the sanitation facility and the garden will involve technicians of *PU* as well as GDTAF, CCI and local experts and builders. The idea of the construction workshop is to make the building process interactive and a learning experience for each party. During this part, *PU* will acquire the necessary construction skills and understanding to build the future sanitation facilities.

3. Awareness raising and closing or opening event: At the end or the beginning of the building process a one day event will be organised to spread the word about the importance of improved sanitation and the advantages of the dry sanitation technology as well as presenting the Pilot Toilet to neighbours (the Keko Machungwa community), authorities and other federation groups.

The event expects to gather approximately 200 inhabitants of Keko Machungwa (circa. 15000 people are living in Keko in total) who will be able to see the pilot and get a close insight of an improved sanitation facility. The event will also serve to mobilize people so they also start taking initiatives to improve their own sanitation facilities. The event will take the newly built sanitation facility and garden space as the centre of interest and as an example for the community. During the event, there will be speeches and artistic performances that will serve as an entertaining way to inform the participants. There will also be some brochures and flyers with relevant information about improved sanitation and the dry toilet technology.

II. 1. 4. Other participatory planning and design methods

From the beginning of this project a lot of emphasis has been put on the importance of working together, planning together and sharing ideas, expectations and fears, first through *City in Transition's* basic requirements and later on through own initiative as an accepted set of principles and methods and mindset. The various participatory planning methods, activities and tools, that have been used during the whole process with PU and CCI are exposed here as well as some of the challenges, and things that worked. This is done with help of extracts from the log book and photos from the field. For sake of simplicity I have first listed the methods and later on detailed them and the challenges that occurred through each phase (see phases at p.54, 57).

Methods used in each phase, challenges and things that worked:

Before the first phase was the **recognition phase or immersion phase in January-May 2013**. During this phase all methods are intended to create a link and understanding between the community and the architect (expert or team of experts) (see paragraph II.1.1.1):

- ~ Visits to the community (two week field trip)
- ~ Singing
- ~ Informal discussions and walks through the settlement
- ~ Theatre play (about dry toilets in Finland) to create a common ground
- ~ Hopes, fears and expectations workshop.

~ Use of photos and images to facilitate the exchange of ideas and concepts

The outcomes from this phase were the action plan or vision made with PU. The combination of the activities above made it possible to get a good understanding of the challenges encountered by PU, create a bond with the community and make plans for the future (fig.8 p.55).

In phase one (12.2013-04.2014), which was the preparation period, the methods focus on gaining more specific knowledge about the site and beneficiaries of the future “Pilot”. This phase did not involve a lot of direct exchange with the community as it was done from Finland. The main challenge was communication. It was really slow and not all information needed about the site was given to me. Simultaneously as the “Sanitation improvement and social enterprise” project was just starting, things were quite slow and no one had any experience in working with each other (GDATF and CCI). If one would engage in such a process it would be advisable to do this phase on the field as communication issues can be avoided.

- ~ Email exchanges with NGO
- ~ Preliminary design and planning
- ~ “Pilot” proposal (see p.68)

Phase two (04-05.2014), which consisted mainly in the **construction and implementation of the “Pilot Toilet”**, was focused on knowledge exchange and learning by doing (see Pilot Proposal, as a stand alone method in section II.1.3). As a note it is important to add that, the communication during the preparation phase was so difficult, that most of the designing and planning happened during the implementation phase. For example on the first day, which was also the first site visit I was informed for the first time of the number of people who will potentially be using the toilet as well as the final position of the toilet.

The main methods, activities and tools were:

- ~ Co-design
- ~ Learning new construction techniques by doing
- ~ Common eating times and places during construction and trainings
- ~ Informal discussions (hanging out)
- ~ Formal trainings on specific topics (urine use...)

Some design decisions were made with PU. As an example, here is an extract from the logbook that gives an idea of the process on the field:

[I introduce the new design on the white board and realize some faces are confused.]



During phase two, PU building the “Pilot Toilet” base with recycled bottles.

I then take a new sheet and place it on the ground and draw the interface on the ground so I can demonstrate by acting the different steps of the toilet use. Faces shine of comprehension again.

On the new toilet design and space PU asks if two holes will be in use during the same period. I realize I hadn't thought the space completely through. If people were to use two holes at the same time there would be a need for some kind of separation between both holes so two people could use the toilet at the same time without giving up privacy!

So we redraw the toilet space in 10 minutes. Ideas fuse!

"We need two doors.

- Why are the stairs like this?

- Why couldn't we have the stairs like that?

- What material are the stairs?

- A ramp would be good, accessibility is very important".

I think, explain and we agree to the version I will later draw and we then will build. This was the most efficient participatory planning session.]

Most things worked as planned and most of the intentions set in the proposal (see

proposal "What is the Pilot about?" p. 68) were achieved despite the many challenges that arose.

~ It allowed me to discover some new skills in the community.

~ PU was able to learn the new techniques that were introduced to them, namely the bottle-wall construction technique and some of the new techniques related to the sanitation system (placement of urine pipes and



Above, a new technique to create panel invented by the toilet's beneficiary (CTN), Left, cement block carving and right Mabanzi (rest wood) walls.

creating sealed openings in the roof for the ventilation pipe). Although they did not understand all details of each technique, and later in the process, as will be described in Part III, some of the techniques needed to be refined and re-explained to the members.

It is really important when trying to learn/teach-by-doing to have good teachers! It should be thought of before the beginning of the process. If the community has good teachers amongst them the method can prove to be very efficient. In the case of PU, although there is a trained technician amongst the members, his teaching abilities were not sufficient. This led to difficulties of communication and exchange between me and the community and sometimes also to mistakes in the construction process.

[I observe that the women are too often observing or doing the simplest tasks. By lack of confidence or lack of feeling included. Ima the "builder" as they call him is working along mostly with one of the men Joseph and not proposing or explaining things to the women, although his role as a sort of construction teacher is very important. He is also not considering the plans, nor asking questions he prefers to work his way, quickly rather than discussing issues and the plans. There were quite a few mistakes during the process that could have been avoided with better discussion.]

On the other hand CTN (owner of the Pilot toilet) , who I later discover is a level two carpenter, is looking for the discussion and to learn new things and to understand. He asks and double-checks with me during the construction, to make sure all is fine and following the vision. As I had repeated a few times, the plans were what they were and the level of detailing quite poor, which necessitated discussion and questions, it worked with some and was impossible with others,

maybe their sense of pride or simply habits (28.04.2014).]

~ It allowed to experiment with some new materials and techniques (rest wood [Ma-banzi], bottles...), and the testing of the first EcoSan toilet of this kind

~ It allowed some members of PU to share specific knowledge. For example Ima was able to teach on his technique of "cement block carving" to the rest of the community.

Phase three (05.-07.2014) was the phase after my visit. Construction was still going on (walls, roof, grey-water filter, doors, stairs, finishings), and I was coordinating from Finland through Peter, the civil engineer working for CCI.

The greatest challenge during this period was the communication. It seemed impossible to know what was really going on at the site as no information was coming from the DSM.

~ Long distance communication

~ Participatory construction (beneficiaries involved in construction)

[I am feeling a big gap of comprehension between Peter and I, on top of the lack of communication. We speak different languages. I would like collaboration as equals where we could exchange and discuss but it seems to be impossible (13.05.2014).]

[It feels a bit like the project has been sabotaged and that any proper communication is going to be impossible but I am not giving up...It is crucial to set clear meeting times and make sure the goals and objectives of the project are read and understood by all participants in the project. The local coordinator still needs to be instructed on the goals and activities of the project. He is not aware

of the full extent of the project...I still haven't received any feedback and reporting on the construction.(03.06.2014. "Never give up").]

[Nothing is perfect, especially not long distance work collaboration...Ideally I should have stayed in Dar es Salaam for the whole time of the construction, which was not an option as I have other duties here in Finland. But it is something to be considered for people who intend to do similar works. I guess the solution for a smoother process would be to either find a partner that has the same communication habits than you do or to actually stay on site to judge of the process and participate yourself...The whole process has been difficult for everyone as it is all unknown but if we at least all learn from it, then we have made a tremendous progress for the future toilet constructions (04.06.2014 "Clear Instructions").]

Most impressively achieved was the goal of "bringing new inspirations to PU and share ideas" (see goals in Pilot Proposal).

[CTN has designed and made a door out of wood and bottles. It looks quite nice and stable. I am thinking of the use of that new technique to make the walls of the super-structure for the future toilets. CTN is covering the inside of the toilet with polycarbonate sheets to increase privacy (18.07.2015).]

II. 2. INSIGHTS FROM THE FIELD

Architecture as a language:

Architecture is really a language, a way of working, it is neither the aim nor the main question. As my language and as a discipline I learned that it is not more important than other disciplines or other matters within the project and within the team.

The question remains, as how to communicate with other languages. What is the common language and how important is it to make yourself understood?

Another planning and design approach - Participation or Assessing methodologies through reality checks:

Why is participation so important in this work? What does participation mean in a project like this one? Participation can be different things, it can be a mindset, a method or a tool as Sanders et al. explain in *Convivial Toolbox* (2012), although using the term co-creation rather than participation. The use of participation can create at least “three different types of values: monetary, use/experience and societal.” In the case of the “Pilot toilet” project, participation was aiming at creating societal value as a mindset, a method and a tool. But the “broadest and most long-range of the three perspectives and the one that has most potential to have a positive impact on the lives of people” (SANDERS 2012), participation as a mindset was the one the project was most focused on throughout the whole process. According to Sanders (2012), everyone is creative, so as an architect or designer when working with communities it is about how to best involve people’s creativity to find crea-

tive and needed solutions. The people of Keko Machungwa acted as experts of their own environment and I acted as an expert in my own field of study. The combination of both expertise allowed a rich exchange and equally rich outcomes.

During the “Pilot” on my second visit to DSM in July 2014 I realised that without knowing it, I intuitively was to applying participation as a mindset. More precisely I was implementing the premises of an adapted version of Giancarlo De Carlo’s principles on architecture and participation. This principle called “process planning”, which he pointed out in *Architecture’s public* in 1969, recognises any planning process as a moving and constantly changing process, where the built architectural object does not announce the end of the process. But

“instead, from that moment a new line of development begins which is consistent with the preceding one but characterised by different qualities. [...] the architectural object changes with the transformations which the user imposes on it as he or she adapts it to varying practical and creative needs; but the user also changes with the stimulation which the intrinsic quality of the architectural object transmits to him or her.” (DE CARLO 1969).

In this project the “process planning” principle, coined by De Carlo, took a slightly different shape but remained a way to enter in dialogue with the user. I had recognised early on that there is no perfect solution of a toilet and that each toilet, for each household demands a different approach, because the elements/context may be different. So it became important to let the planning process open and learn after and during each step,



fig.14

either from PU or the users, so that after each toilet there is space and time to learn. First of all this process would allow PU to learn from others through the process but it would also allow users to give their input so that the toilets would be adapted to their needs.

could be used as doors (in the case of the “Pilot”) or as wall panels (fig.14).

This kind of behaviour is exactly the sort of result I was looking for in the project. I am there to help them see what they don't see, creating an impulse for their creative minds.

Here is an event from the project that will illustrate this quite well. In April 2014 I was following and guiding the construction of the Pilot toilet using bottle-wall and dry toilet technology. It would be the first of its kind in Keko Machungwa and in the whole Dar es Salaam. The idea of the bottle wall was a wish from PU. So I had agreed to plan the toilet with the new technology to try it out on the Pilot. The Pilot had been planned together as much as possible and PU was really enthusiastic. After two weeks I had to go home and let PU, Keko Youth and Peter (from CCI) continue building alone with some plans (that needed to be revised). It was quite difficult but worked out and when I came back the following July I found the toilet had been pimped-up by CTN (the owner of the toilet) – he had invented a new technology using wood and bottles, a cheap, creative and interesting way of using the materials to create panels that

The key was to include this kind of learning into the process of planning. So with CCI we included the technology into the material options for the future toilets. And last but not least, through CTN's creative contribution, we finally have a locally made solution with readily available materials that might be able to significantly reduce the cost of construction - which was a primary criterion for the toilets to become more popular amongst the citizens of that area (and the rest of Dar es Salaam).

The importance of setting goals and a common vision:

When looking back at the whole process I realise that the role of the proposal was crucial. It allowed me to clearly assess the methods chosen and their success. Much like a brief in design thinking methods, the Proposal worked as the driver of the "Pilot" project.

Frog's perspective:

Two of the very first things I remember being taught in my architecture studies were the frog's and bird's perspectives. They are two perspective drawing techniques that allow a different view of a building; from above or from the ground. Later on during my studies a strong emphasis was again put on the importance of changing perspective, scale, materials or methods of expression.

During this inquiry process I had the opportunity to reassess my knowledge or methods through the constant change of perspectives. The frog's perspective, the close up perspective, where the architect-citizen (BLUNDELL JONES 2005) is directly involved in the social interactions between the people she/he is working with, allowed a direct

exchange with the stakeholders and beneficiaries through workshops, discussions and various other methods or simply and most importantly through just being around people. It is also in those moments that you get more aware of misunderstandings for example, which in the end are the results of cultural differences.

Bird's perspective:

Understanding the context from another perspective with a larger cut-out and distanced view is what I would like to call the bird's perspective or in this work the context analysis and framework of Part II. there are many methods and ways to proceed. In this work this section can be found in Part I point I.2. It corresponds to the analysis of the lack of sanitation and different stakeholders to sanitation with the theory of wicked problems, which helped us identify the lack of sanitation as such.

It is really the combination of both perspectives that allows rich and holistic responses. Similarly Balint et al. in *Wicked Environmental Problems* encourage the readers to "think of wicked problems in a holistic fashion" that involves "having a deep understanding of the context", which I call in this work the bird's perspective. But it also involves an "appreciation for the multiple perspectives, interests, attitudes and values that the multiple stakeholders bring to the decisions", which in this work I call the frog's perspective and involved all field work and times of presence and working directly with PU and other stakeholders (phase two and three of the Inquiry process, see p. __)

At the same time, understanding the context is a time dependent factor: one can not grasp the culturally attached values or perceptions at once in a magical moment. Tara

a friend of mine used to talk about the “blank page”, that one needs to feel like the blank page that wants to be filled. The attitude of the architect needs to be indiscriminating and blank in order to perceive all that needs to be perceived. That is on the human or frog perspective level. The bird perspective or satellite view is another aspect of understanding the context and situation.

Dispossession:

As soon as a drawing is showed, an idea is expressed, the drawing or idea leaves the architect's head, he/she does not have ownership of the work anymore. The work becomes part of the common, it can be shared and discussed.

This is a completely different approach from setting final plans of a building, building it and having users only use it. Of course a lot of the design outcomes emerge from my personal taste, knowledge and experience but once the drawing stands in front of PU and they start commenting, the process of shifting ownership activates and they start making the design their own. In each phase it was important that PU recognised their own values, experience and knowledge, so that these can be added to a foreign idea, and a foreign and strange looking object. It necessitated, time, repetitive discussions and exchange with the community and good understanding of the context from the architect.

A vision and reality bound planning process:

The objective of the input in the “Pilot” project has been since the beginning to enable a shift of ownership from the designer (expert team, planner) to the actors (PU)

and eventually the beneficiaries (users of the toilet). It has been the reality. PU in this case, as the group of actors (technicians and future enterprise owners) needed to be instructed and involved in all aspects and activities of the enterprise-to-be (which has the aim of multiplying improved sanitation facilities in DSM), in order to be able to repeat and sustain them.

The “Pilot” as the first step towards building this enterprise was planned and executed with this in mind. Thus it was very important to be as much as possible in contact with the reality, the context and the people, to instruct and constantly seek for relevant information from the locals, existing projects and previous failures that might influence the plans. But also make decisions with PU in order to let them make the project theirs, without of course forgetting to support them as much as they need.

In this particular context the role of the architect was more this of an educator, or facilitator, rather than one of a dictator, imposing foreign and strange ideas. It is also important to note that coming from another country, only visiting a few times during the project, I remained an exterior eye.

Nevertheless this shift of ownership seems to have operated during the construction.

“Also the project was very collective and participatory; it involved all the stakeholders in the community. Thus bringing the sense of ownership. The communities were largely happy to have the project in place (dry toilet).”(CCI 2014)



PART III. PLAN- NING SELF- SUSTAINABLE TRANSFORMA- TION

CAN EXPERIMENTAL ARCHITECTURAL INTERVENTIONS BRIDGE THE GAP BETWEEN ARCHITECTS (EXPERTS, PLANNERS), COMMUNITIES (CITIZENS), AND AUTHORITIES, FOR THE IMPROVEMENT OF THE BUILT ENVIRONMENT?

In this chapter I expose the outcomes that have emerged from the learnings of the “Pilot Toilet” process.

These consist mainly in the “reproduction” phase. A phase where the actors, PU, multiply the number of dry toilets on a similar model to the “Pilot Toilet”. The toilets are meant for households and have a capacity of 5 to 15 people. It was expected that, based on the knowledge acquired from the previous phases, PU with support of CCI, would be able to re-created the process. All outcomes are to be seen as a whole rather than separate. Some of these methods or strategies can already be found in the previous Part II, but were put into practice already during the inquiry time. The outcomes in this chapter are part of the same strategy but haven’t been yet been implemented or their efficiency observed.

As a consequence I am able to identify the merits and limitations of such a process and identify ways forward.

III. 1. OUTCOMES

Once the “Pilot toilet” was built and inaugurated came the **phase of monitoring, evaluation and reproduction; the fourth phase** of the inquiry, which took place from 08.2014 to 03.2015.

III. 1. 1. Monitoring

Although the monitoring took place during almost the whole duration of the inquiry, (phase two to the end of phase four), I wasn't able to monitor myself during the whole process but only during phase two and three. For these phases I was able to be on site for a total period of one month during which I observed changes related to PU's skills, construction advancements, and behavioural changes related to the construction of the “Pilot Toilet”, amongst stakeholders.

During phase four I was asking for feedback from CCI and other team members from Finland who were travelling to DSM. In general it was easier to monitor from the field and observe changes myself.

The observations of changes were focusing on:

- ~ Attitudes of stakeholders and larger community towards the ecological sanitation technology
- ~ Acceptance of the “Pilot toilet” amongst beneficiaries, PU, authorities and larger community (DSM, Keko Machungwa, “federations”)
- ~ Scalability of the “Pilot Toilet” to other parts of DSM
- ~ Level of knowledge of PU: on construction, urine use, composting, and other sanitation related activities, such as marketing.

Some of the results of the observations are visible in the evaluation form in Appendix 5 and the “Pilot” video in Appendix 3.

III. 1. 2. Evaluation

The evaluation was done first as a quantitative and qualitative survey in form of a questionnaire, prepared together with CCI, where questions were asked to beneficiaries and PU members. Secondly the evaluation was done in a more interpretative manner through the filmed documentation of the “Pilot” process including interviews of users and actors by a professional filmmaker (see appendices 3 and 5 for the video and form).

Both evaluation methods highlighted the overall impact of the “Pilot toilet”, and as can be seen has highlighted the overall positive outcomes and impacts of the “Pilot Toilet” on:

- ~ Changing people's attitude towards ecological sanitation
- ~ Reinforcing PU's, other “federation” groups' and local authorities' belief that ecological sanitation is beneficial in areas like DSM
- ~ The health of women using the “Pilot Toilet” (although this information was not scientifically verified)
- ~ Giving access to improved sanitation to 9-12 people (Keko Machungwa Youth centre)

To achieve this a few factors were decisive:

- ~ The involvement of different media in covering the construction phase and the inauguration of the “Pilot” (see Appendix 1,

day 1.8.2014)

~ The involvement of authorities during crucial phases (construction and inauguration) have largely contributed to introduce the technology's advantages in such contexts (see Appendix 1, day 1.8.2014)

~ The use of an innovative technique for construction to attract interests both from the stakeholders and larger Keko Machungwa community

~ The participation of PU and beneficiaries during planning, designing and construction phases to achieve a shift of ownership

Both monitoring and evaluation methods are ways to help the project team to improve and understand, first of all the impacts of actions and the outcomes of the processes.

III. 1. 3. Reproduction

The reproduction phase consisted in the construction of further toilets for households in Keko Machungwa (max. 20). It was also the moment to see if some of the goals and intentions of the "Pilot toilet" proposal were bearing any fruits. The strategy was that PU would be using the knowledge acquired in the previous phases, in order to build the toilets, whose design would be similar to the "Pilot" with some variations in the size and materials (fig.16). The same sanitation principles would remain, as well as the use of bottle-wall technology for the base. It was also the phase when my role clearly expanded from its already large boundaries.

Education:

To be able to build further household toilets PU needed to be educated in different subjects (fig. 15). The scheme for reproduction was to build 20 household toilets on approximately the same, and PU would be able to rely on what they had learned during the "Pilot" and inauguration phases, but also on their previous knowledge as trained technicians. During the previous phases PU had received trainings on the following subjects:

~ Urine as a fertilizer, collection and use

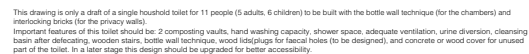
~ Various construction techniques including building with recycled bottles (done in learning by doing way during the "Pilot" construction phase)

~ Composting



fig.15 Above, PU learning how to build with bottles. Below a formal training session with PU.

To help PU in the process it was decided to set up a marketing brochure that would give the basic information to potential clients during their advertising activities (see fig.17).

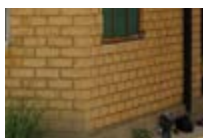


CONSTRUCTION:

The base of the toilet is made of bottle-wall technology using 0,5L Pet bottles, nylon ropes and cement mortar. The bottles are used like bricks and laid on top of each other with a layer of mortar in between each layer.



For the walls you can choose between three different materials, costs, and durability levels:



Interlocking bricks.



Mabanzi and Bottle-frame wall.

Each material has its qualities, either in terms of costs, longevity or sustainability.

PHAST UJENZI: biashara, elimu, ujenzi, maonyesho!



We are a community from the Federation of Urban Poor and work to improve our environment!



We have knowledge in hygiene education, ecological sanitation, construction, use and maintenance of improved sanitation facilities and keep our knowledge up to date!



Our aim is to give education and information about sanitation and hygiene to other members of the community, as well as to provide services of construction and maintenance on improved sanitation technologies (Eco-san and pour-flush toilets). We also sell natural fertilizers collected from the dry toilets we build. We strongly believe that through all these activities we are helping to improve the environment in which we live!



For information contact:

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husnashechonge@gmail.com

"Order and ask for a cost estimation for your dry toilet from Phast Ujenzi before end of December 2014 and get a grey water tower for free!"

ECOSAN TOILET



Choose the safe solution for your household with *Phast Ujenzi*!



ECOSAN TECHNOLOGY:

Ecosan toilets are a sustainable and safe solution where urine is collected separately from faeces:

ADVANTAGES:

- Does not require a constant source of water.
- No real problems with odours and vectors (flies) if used and maintained correctly (i.e. kept dry).
- Can be built and repaired with locally available materials.
- Low capital and operation costs.
- Good for areas where pit latrines don't work (high water table, collapsing/rocky soils).
- Large scale nutrient recovery is a realistic possibility.
- Suitable for all types of users (sitters, squatters, washers, wipers).

Things you should keep in mind:

- It requires education and acceptance to be used correctly.
- Make a good use of it to avoid clogging!



The faeces are stored in here.



The urine is collected under here...



... faeces and urine are separated through the Eco-san interface here...



and the water from shower and cleansing is filtrated here.

MAINTENANCE: The toilet is easy to use and maintain. *Phast Ujenzi* will be responsible for collecting the urine containers and replacing them by empty ones. They will also be the ones emptying the compost: the first emptying process happens after two years of use, from then it has to be emptied only once per year. If preferred, the users have the possibility to carry out the maintenance individually, but careful training and instruction must be received by *Phast Ujenzi*.

HOW MUCH DOES MY TOILET COST?

The price of the toilet depends on your own contribution. We use a cost sharing system, which means you can contribute with raw material and labor. The more you contribute, the cheaper it gets.

Construction of household toilets:

Once PU had found clients it was time to build and see whether the education provided to the group was sufficient and efficient and whether the “Pilot’s” intentions were in accordance with the actual outcomes.

During the reproduction phase PU faced many challenges (see log book, October). Mostly it was recognised that a closer support and guidance was needed in order for the quality of construction to be met but also to allow continuity in the learning process. Another challenge was that some of the members, especially women had left the group because of pregnancy, meaning that PU needed new members who needed to be trained. Here is an extract from the logbook to illustrate some of the challenges (fig.18).

[I have just looked at pictures of the two October toilets. It seems that there is a real need for consequent construction education and that the sole instructions given during the “Pilot” were not enough for the community to understand, firstly the steps to follow

for the laying of the bottles and secondly the importance of quality work, maybe thirdly also the importance of communication with CCI and I during those days as they are still in a learning process, they should seek for advice when not certain of their actions. [...] It seems there needs to be someone the whole group trusts and listens to that should be in charge of checking the quality of the work like a site conductor, [...] In a later stage maybe PU has learned and understood enough so they can check the quality on their own but as long as the learning process goes, proper ways need to be employed, maybe that person can act like a sort of coach, that would assist Hezron and would have knowledge in construction, communication, and facilitating skills as well as community working (24.10.2014).]



fig.18 Before and after supervision and quality check of household toilets.

III. 2. ASSESSMENT OF THE INQUIRY AND IMPLEMENTATION PROCESS

Testing the “Pilot Toilet” outcomes helped identify what worked and what did not.

The feedback gained through evaluation, monitoring has partly helped in identifying

shortcomings or positive outcomes. Below are two tables: one listing the limitations and the other one the merits. Both tables give the premise within which the statement is based as well as recommendations or actions taken for a way forward.

Limitations	Premise	Way forward
Constraints of the project	The “Pilot toilet” process is set within a three year project period	Allow projects to be taken for a longer period of time to ensure sustainability and continuity of the activities
Working as an external eye	I was only able to travel 1 month during the year due to budget limitations	Allow enough budget for travelling especially in the first year of working with a new partner
Too little time on the field	This was a problem for the monitoring of the process as I had to rely on other people's interpretation and wasn't able to react myself to eventual changes or problems. I wasn't also able to support PU as much as I could have been supported them during the construction of the household toilets.	If one plans to repeat similar work it is really important to make sure of the continuity and adequacy of the learning process. If one can not be on site sufficiently, I recommend that support is provided locally through educators, site conductors or a foreman (for construction purposes), who have sufficient experience to be facilitators, teachers or guides at least.
The members of PU are technicians	PU members have been trained as technicians, most of them have basic construction skills, but no planning skills.	They need more support from local experts (construction teacher, site conductor, foreman) with planning skills in case the architect is not able to give support all along the process. Later on in December 2014 it was decided that a foreman would be needed to supervise the quality of construction and checking the adequate training of PU members in collaboration a CCI engineer who would take on the role of site conductor.
Communication	<ul style="list-style-type: none"> Communication problems arose because of the language barrier (Swahili-English) as most PU members do not speak English. With the partner NGO the communication problems arise when using different terms used for the same things, or terms specific to one discipline 	When working with different disciplines remember that each discipline, or profession has its own ways of expressions and that the use of simple terms or even drawings, rather than technical terms is sometimes better to avoid confusion and misunderstandings
Adaptability of partner NGO	Organisations have their own ways of doing things, their own approaches, methods, tools, that might differ greatly from your own ways	Simply a notion to keep in mind
Understanding of the roles of each stakeholder	It was difficult to understand precisely the role that each stakeholder plays while not being able to be on the field more than one month	Thorough stakeholder mapping is advised
Budget	<ul style="list-style-type: none"> Not enough budget was available to travel more than twice or for longer than 1 month in total. A fixed budget was set for each activity Everything depends on the budget. What you don't budget or budget wrong will affect the project 	When making a budget, identify all the needs and costs as precisely as possible (material costs, inflation rates), especially if a project is meant to span over several years.
Small project scope	This project tackles only a tiny part of the issue of lack of sanitation in DSM.	To allow scaling integrate the project within a long term plan
Dependence of the community	Enabling the independence of the community to the point that they are able to reproduce the practices that have been introduced and adapt them to eventual changes without changing the purpose of the process is a long process that takes patience, repetition and communication. The same way that resolving wicked problems needs a “smart mix of cognition and interaction” (Grin & Hoppe 2000, 180)	Appropriate support with education and guidance is necessary during the whole process

"Pilot toilet" design	<p>_ Hasn't directly succeeded in bringing the cost of construction down compared to previous EcoSan models, but has succeeded to indirectly bring actors to create even more cost efficient technologies (the bottle-frame by CTN).</p> <p>_ Isn't a ready product in the sense that it can be copied and pasted 1 to 1 into another part of the world (although.. it could but it is not its purpose). The final design is rather the result of local constraints (availability of materials, local conditions, local socio-economical context)</p>	<p>_ The strategy employed is to increase affordability through other aspects than simply reducing construction costs. For example by allowing clients buying the service, to participate to construction in any form or way they want. i.e. by helping in a certain part of the construction or by providing certain materials by him/herself. Another way is to allow people to take a loan allowing them to pay for the toilet gradually during a longer period (in this case, two years).</p> <p>_ The strategy to adopt in this context is to slowly with every other new toilet (choose a reasonable rate) to introduce new techniques, technologies or methods as the results of the continuous refinements of the scope, and continuous feedback from all stakeholders. The introduction of a new "Pilot Toilet" in every new settlement, can help as an appropriate time and place to experiment the new.</p>
Construction skills	<p>The construction skill trainings provided during the process didn't suffice in giving enough support to PU for them to build the following household toilets, first of all because the models (dimensions, materials and some of the techniques employed) differed. Secondly because the teaching during the "Pilot Toilet" construction wasn't given enough thought, time, preparation and emphasis, and lastly because not all members who were present during the "Pilot Toilet" construction were present during the reproduction phase (some ladies got pregnant and were not able to share their knowledge with new members, who hadn't been present during the "Pilot Toilet" construction. This resulted in discrepancies between plans and executions, where the quality, sizes and handling of materials were not executed in a satisfactory manner (wrong sizes of toilet interface, misplacement of doors and spaces, use of broken bricks, lack of attention to straightness of bottle-wall constructions...).</p>	<p>Part of the plan for better capacity building on construction skills is that PU will now be supported on a daily basis by a foreman who will be in charge of checking quality and supporting members in the execution of techniques. Additionally a civil engineer from CCI is in charge of site conduction and support concerning planning issues (like changing the size of a toilet if a site needs adaptation)</p>
Unpreparedness	<p>I started working on this project with no previous experience in intervening in such a context or about such a subject (sanitation). I had only an idea of what my input should lead to, namely allowing the community to become the owners of whatever would be started. Owners in the sense that they would become able to understand, repeat and adapt the intervention. The only certainty was that PU needed support, financially and creatively but also support in gaining confidence into expanding their horizon and exploring new possibilities for the development of their sanitation activities.</p>	<p>When starting to work on a new project in a new environment it is difficult to be prepared as all is unknown, but to compensate this lack of knowledge, repetitive or longer visits to the field can be very helpful in gaining sufficient understanding of the context and stakeholders.</p>
Reproduction	<p>_ Reproduction was thought to be possible with only the training received during the "Pilot" construction.</p> <p>_ Each site for a household toilet is different, consequently needing adapted plans to each special situation</p> <p>_ PU's members are technicians, therefore needing support from local partners with planning skills to help PU adapt plans</p> <p>_ PU are still being trained in the process and didn't receive enough knowledge or training during the "Pilot toilet" phase two and three, therefore the reproduction has shown that PU needs continuous guidance and training.</p>	<p>Ways forward can be found in the "Construction skills" box above.</p>

Merits	Premise	Way forward
Scalability	The "Pilot toilet" process is scalable within Dar es Salaam as there are various sanitation groups from the TFUP who can experience the same process	The project "Sanitation Improvement and Social Enterprise" will go to 2 more settlements (Vingunguti and Tandale) in 2015 and 2016 and more toilets will be built and possibly the project will be prolonged. The same process as has been developed and experienced here will be taken to these settlements. Each of these settlements are from a different municipality, consequently all mayors of all municipalities will have witnessed the project's benefits, thus creating a stronger more united impact DSM wide.
Working as and external eye	Gives the ability to see things that people from the inside do not see anymore	Allow enough time off the field to distance yourself and reflect on your experiences
Little time on the field	Allows actors to take responsibilities rather than rely on the architect or expert	More time isn't available but a stronger communication with the local foreman and engineer in charge of the construction supervision has been installed in order to give PU the necessary support.
Creative impulse	The "Pilot" proved to be successful in creating both a creative impulse amongst the members of PU and direct collaborators. It has also helped in creating greater demands for EcoSan toilets in the community. First of all through its location; the plot of one of Keko Machungwa's most respected and well known citizens. Secondly through the use of the bottle-wall technique, which helped to get a lot of attention and interests from the inhabitants of Keko.	The "Pilot" + reproduction (construction of household toilets) process can be used in every new settlement that needs to be covered.
"Pilot" design	The design is working as the users are overall satisfied with the outcome and are able to use the toilet as intended.	The use of bottle-wall technology will be kept because of the advantage of using readily available materials such as locally found sand and bottles. It will also be kept because of the effect its use has on potential clients who become curious and interested because of the use of such an innovative technology.
The "Pilot" construction phase	It has created great sense of ownership both amongst the users (who were all involved in the construction) and amongst PU who are very proud of what was achieved (especially because of the innovative character of the toilet, safe technology and the fertilizers produced by these).	The idea of the "Pilot" as a way to start activities in each settlement will be kept and implemented in the coming years. It would be interesting
Unpreparedness	I started working on this project with no previous experience in intervening in such a context or about such a subject (sanitation). I had only an idea of what my input should lead to, namely allowing the community to become the owners of whatever would be started. Owners in the sense that they would become able to understand, repeat and adapt the intervention. The only certainty was that PU needed support, financially and creatively but also support in gaining confidence into expanding their horizon and exploring new possibilities for the development of their sanitation activities.	Unpreparedness allows to have no preconceived ideas on how to deal with a problem and in that way encourage one to try to understand the context and problem at hand rather than pulling things to fit into methods.
Collaboration	The collaboration with a local NGO that has strong roots and links with the communities is crucial for architects (Experts, planners)	Continue collaboration with local NGO strongly rooted in the Tanzanian society is the way forward
Practical intervention vs. Working to reach consensus through facilitation?	Practical interventions such as the "Pilot Toilet" can have a much greater impact than simply the final physical output, in this case a toilet.	If considered as part of a whole, for example a process planned over a long time period, a practical intervention such as the "Pilot Toilet" can become more than just "a toilet in Keko Machungwa", it can become part of a larger whole, a larger process constantly in movement and changing, which effects its context to the scale of its implementation

III. 3. DISCUSSION AND CONCLUSION

III. 3. 1. Discussion

In this inquiry I discussed the opportunities for architects in intervening in community-led sanitation practices in informal settlements of Dar es Salaam, Tanzania, as a way to participate in creating a more just, needed and desired environment. I have engaged into this inquiry driven by two existential questions: "How as an architect, with my limited abilities, skills and capacities can I help shape our built environment?" And secondly: "How as an architect do I not participate in creating a non-desired environment?".

For that I engaged in a nonlinear process led by practice, in the context of community-led sanitation improvements in informal settlements of DSM. I was able to start dealing with - and understand - the wicked problem of lack of sanitation in Dar es Salaam. I first was able to see the situation from close through my own "frog perspective", and the eyes of the community (PU) that I engaged with. In parallel I changed perspective and focused on sanitation as a global issue. I tried to understand the meaning of sanitation in different cultures and its evolution in relation to cities in the western world. I found out that sanitation in cities of the global south, more than a basic human right, is also an intrinsically complex and a socio-cultural-economical issue that necessitates equally complex ways of resolving.

This led to analysing the lack of sanitation in Dar es Salaam and finding out that lack of sanitation in DSM is not only complex, it is a wicked problem that can't be defined clearly because related to societal issues (RITTEL & WEBBER 1973). In other words a

problem made of continuously moving parts and people with different perspectives and beliefs. When dealing with wicked problems one needs to "think in a holistic fashion", that involves "having a deep understanding of the context and an appreciation for the multiple perspectives, interests, attitudes, and values that the multiple stakeholders bring to the decisions" (BALINT ET AL. 2011). Which is why additionally it was important to situate the intervention of the "Pilot Toilet" - as my personal way of resolving the wicked problem of lack of sanitation in DSM - in relation with similar ways of doing architecture, through literature and interviews to practicing architects about the role of the architect in and with society.

Before that, I had engaged in my own practice through the "Pilot Toilet" project. In this empirical inquiry I exposed my highly personal approach - which arose from questions from the realm of intuitiveness rather than from an actual profound preliminary background or scientific research.

It appeared that such a practice in which the beneficiaries, actors and users are involved in all stages from the discovery phase to completion and evaluation, is an opportunity for architects to first of all transform the discipline through participation - which contributes to an evolving discipline - but it also contributes to the creation of a built environment that responds to real needs and aspirations of the people who are involved or will use the facility.

However the question remains whether such a practice can bring an answer to the wicked problem at hand.

Conclusion

While a city like DSM struggles to address the needs of a growing population for basic infrastructures like the access to improved sanitation, groups of the “federation” of the urban poor have gathered to address the serious situation with support of a local NGO. Such actions rely on the idea that improvements arising from the needs and the participation of the grass-root level represent an effective way to address issues such as the lack of sanitation. With help of wicked problem theories I was able to highlight that such practices or solutions, if implemented in a concerted effort combining a “smart mix of cogitation and interaction” between all stakeholders (GRIN & HOPPE 2000, 180) have a chance to effectively address the problem at hand. Though keeping in mind that any solution is neither “true-or-false” but rather “good-or-bad” (RITTEL & WEBBER 1973)

In accordance with this, architects can play, have played and will continue to play a role in shaping society. Yet, this depends to a large extent on how architects perform architecture. Architecture and participation, “spatial agency” are some of the terms that try to define this engagement or consciousness some architects have, seeing themselves as part of society rather than apart and conscious of the impacts their actions can have on the society. However there seems to be a certain fear of the use of participation amongst architects, because participation brings forward the moment of tension when “ideals and reality of architectural practice” meet (BLUNDELL JONES ET AL. 2005). Hence while it seems undebatable that architects do play a role in shaping the social and political space - spaces being inherently social - there does not seem to be a clear definition of what that role is.

Consequently today at a time where a clear

need for changing methods and practices has been identified the role that architects want to take on needs to be defined more clearly in order to give a direction to present and future generations of architects (planners, experts).

“Spatial agency” a notion that combines the consciousness of the consequences of one’s actions as an architect (planner, expert, citizen) on society combined with a willingness to “transformatively engage with structure” (AWAN 2013) - society - starts to give an answer to the need for architecture an space shapers to transform.

In the case of the “Pilot Toilet” this role was defined by the context in which the action was done. I was acting as a facilitator, an urban curator, an architect-citizen, constantly aiming at working with and shaping with the users, stakeholders and beneficiaries. Although never denying my own skills or knowledge but rather considering those as part of a set of skills and knowledge as a compound from all actors’ knowledge, a sort of common knowledge, where the combination of these is the true and legitimate owner of a process. This showed the different opportunities there are for architects in working with community-led sanitation improvement. In another context these opportunities may be totally different and the findings in this case are to be understood as deeply context related.

III. 3. 2. Note

While this master’s thesis - in a attempt at striving towards a holistic approach to problem solving - gathered valuable knowledge from a broad scope of disciplines, which can inform other areas of practice, these were used and written about, from my own per-

sonal perspective, the one of an architect. More work should be done in investigating such practices in other areas of knowledge such as design, urban planning, landscape architecture or even agriculture, where the same attempt at striving towards a more holistic approach can be used.

III. 3. 3. Future prospects

This research provides at least one potential direction for future work. The findings could be used as a base for proposing a planning process (fig.19) for the improvement of sanitation through community-led sanitation solutions for Dar es Salaam, Tanzania. I especially recommend to explore the possibility of adapting the “process planning” principles pointed out by De Carlo in his *Architecture's public* (1969). Bearing in mind the need for more just and needed built environments that can respond to the growing populations and the need for sustainable (see glossary) approaches, the current failures of disconnected efforts, and the power of planning. Concerning “process planning” which puts the accent on the belief that any built object isn't a purpose in itself but rather part of whole, each built toilet could be used as a learning curve for the development of better toilets.

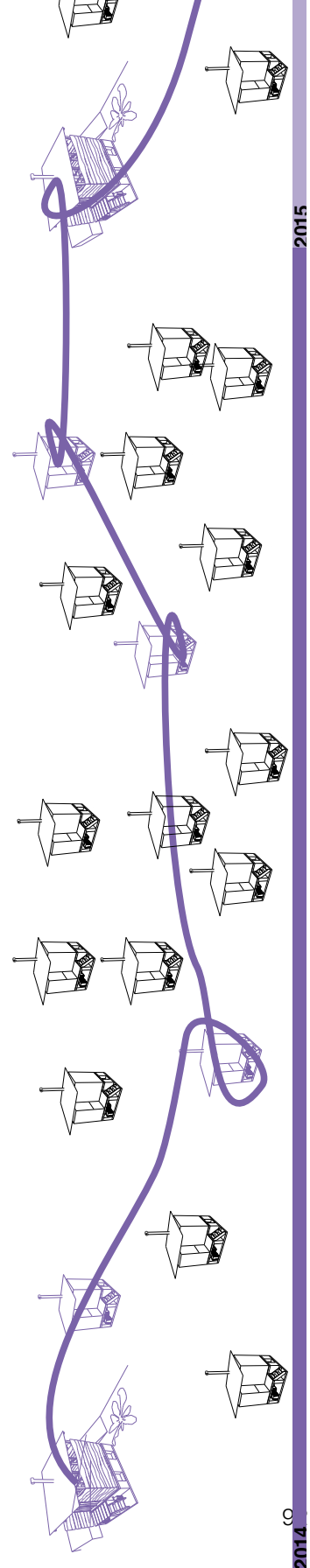
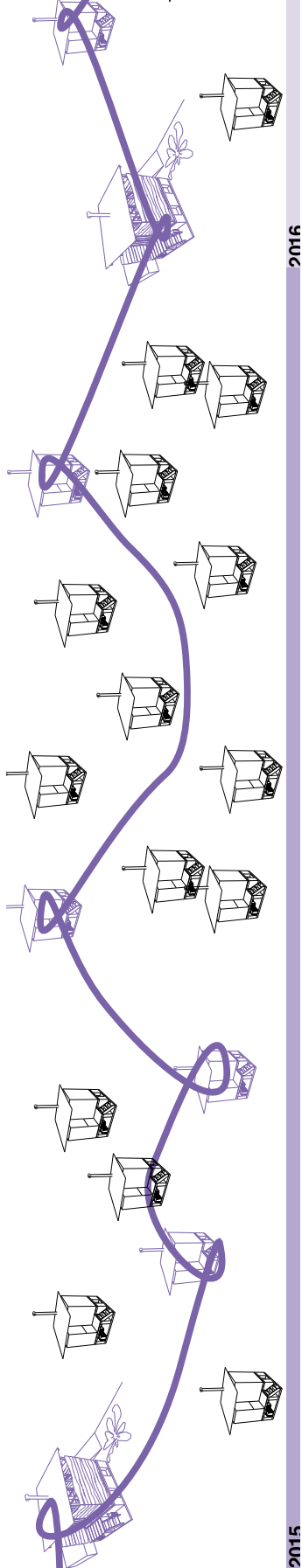


fig.19 An attempt at illustrating what “process planning” could look like in the context of this project.



GLOSSARY

DAWASCO: is a sole provider of water supply and sewerage Services in Dar es Salaam city and parts of Coast region. The Corporation is responsible for the management, Operation, and maintenance of water supply and waste water disposal services.

Improved sanitation facility: (source, WHO and UNICEF definitions of improved drinking-water source on the JMP website, WHO, Geneva and UNICEF, New York, accessed on June 10, 2012)

is defined as one that hygienically separates human excreta from human contact. The different types of improved sanitation technologies can be listed as follow:

- ~ Flush toilet
- ~ Connection to a piped sewer system
- ~ Connection to a septic system
- ~ Flush / pour-flush to a pit latrine
- ~ Ventilated improved pit (VIP) latrine
- ~ Composting toilet
- ~ Some special cases

Sanitation facilities that are not considered as “improved” are:

- ~ Public or shared latrine
- ~ Flush/pour flush to elsewhere (not into a pit, septic tank, or sewer)
- ~ Pit latrine without slab
- ~ Open pit latrine
- ~ Bucket latrines
- ~ Hanging toilet / latrine

~ No facilities / bush / field

(Source: WHO and UNICEF types of improved drinking-water source on the JMP website, WHO, Geneva and UNICEF, New York, accessed on June 10, 2012)

Informal settlements, Slums: (source, Glossary of Environment Statistics, Studies in Methods, Series F, No. 67, United Nations, New York, 1997)

1. areas where groups of housing units have been constructed on land that the occupants have no legal claim to, or occupy illegally;

2. unplanned settlements and areas where housing is not in compliance with current planning and building regulations (un-authorised housing).

Millennium Development Goal target number 7 C: Halve, by 2015, the proportion of the population without sustainable access to safe drinking water and basic sanitation. (UNITED NATIONS N.D.)

Mobilising, mobilise, mobilisation: is a method used by CCI to find urban poor groups that will become savings groups and become part of the *federation*.

Multidisciplinary approach: A multidisciplinary approach to problem solving involves drawing appropriately from multiple disciplines to redefine problems outside of normal boundaries and reach solutions based on a new understanding of complex situations. Multidisciplinary working is often seen as revolutionary by skill-centred specialists but it is simply a fundamental expression of being guided by holism rather than reductionism, as described by Jan Smuts in his 1926 book *Holism and Evolution*. One of the major barriers to the multidisciplinary approach is the long established tradition of highly focused professional practitioners cultivating a protective (and thus restrictive) boundary around their area of expertise. This

tradition has sometimes been found not to work to the benefit of the wider public interest, and the multidisciplinary approach has recently become of interest to government agencies and some enlightened professional bodies who recognise the advantages of systems thinking for complex problem solving. The use of the term 'multidisciplinary' has in recent years been overtaken by the term 'interdisciplinary' for what is essentially holistic working by another name. The former term tends to relate to practitioner led working while the latter term tends to carry a more academic overtone. (Source: Atlas.eu, Multidisciplinary Approach (of study, of research). Available from: < <http://atlas.uniscape.eu/glossarioToto.php?idgl=30&nomegl=Multidisciplinaria%20Approach%20%28of%20study,%20of%20research%29&lettera=> > [03.11.2014])

Participatory Hygiene and Sanitation

Transformation: The Participatory Hygiene and Sanitation Transformation (PHAST) approach has the objectives of improving hygiene behaviours to reduce diarrheal disease and encouraging effective community management of water and sanitation services. The PHAST approach is based on the principle that the participation of communities in their own projects will empower the community and improve its decision making about the services it needs and wants to maintain. As communities gain awareness of their water, sanitation and hygiene situation through participatory activities, they are empowered to develop and carry out their own plans to improve this situation. PHAST is based on seven steps using participatory tools, from problem identification and analysis to planning and selection of appropriate solutions. These solutions may include both construction and management of new physical facilities as well as adoption of safer individual and collective behaviour change. (source: <http://water.worldbank.org/shw-re>

source-guide/promotion/hygiene-promotion-approaches/phast, 16.01.15)

Sanitation: Sanitation is the hygienic means of promoting health through prevention of human contact with the hazards of wastes as well as the treatment and proper disposal of sewage or wastewater. WHO definition:

“Sanitation generally refers to the provision of facilities and services for the safe disposal of human urine and feces. Inadequate sanitation is a major cause of disease world-wide and improving sanitation is known to have a significant beneficial impact on health both in households and across communities. The word ‘sanitation’ also refers to the maintenance of hygienic conditions, through services such as garbage collection and wastewater disposal.”

Sustainability 2.0: “Sustainability as an overarching unity is not found through disciplines, but in understanding the nature of it in creating solutions when shaping the existence by assessing the process, the context and the aim of what’s to be done.” (SALOVAARA 2014).

Sustainable sanitation/ecological sanitation: Sustainable sanitation recognizes that in order to be sustainable, a sanitation approach must be socially acceptable and economically viable. In this way, sustainable sanitation is a loop-based approach that differs fundamentally from the current linear concepts of wastewater management, and that does not only recognize technology, but also social, environmental and economic aspects. Sustainable sanitation is an approach that considers sanitation holistically.

It recognises that human excreta and wastewater are not waste product, but a valuable resource. This view is based on the fact that wastewater and excreta contain significant amount of energy, plant nutrients and also water that can be recycled and reused, thus protecting natural resources (Source: sustainable sanitation, SSWM website: <http://www.sswm.info/category/concept/sustainable-sanitation>, accessed on 15.01.10)

System: A set of elements or parts that is coherently organised and interconnected in a pattern or structure that produces a characteristic set of behaviours, often classified as its “function” or “purpose” (MEADOWS 2008 p.188)

REFERENCES

- Abani, Chris, 2004. *GraceLand*, New York, p. 7.
- Awan, Nishat, Tatjana Schneider & Jeremy Till, 2013. *Spatial Agency*, Schneider & Till, Routledge.
- Balint, Peter.J. et al., 2011. *Wicked Environmental Problems: Managing uncertainty and conflict*, Washington D.C.: Island Press.
- Blundell Jones, Peter, Doina Petrescu & Jeremy Till, 2005. *Architecture and Participation*, P. Blundell Jones, D. Petrescu, & J. Till, eds., London: Spon Press, Taylor and Francis Group.
- Bolt, Barbara, 2007. *The Magic is in Handling. Practice as Research: Approaches to Creative Arts Enquiry*, 1, pp. 27 - 34.
- Boyer, Bryan, Justin W. Cook & Marco Steinberg, 2013. *Legible Practices. Six stories about the craft of stewardship*, SITRA, Helsinki.
- BPD Water and Sanitation, 2006. *Sanitation partnerships: Dar es Salaam case study*. Building Partnerships for Development. Available at: < http://www.bpd-waterandsanitation.org/web/w/www_38_en.aspx>. [10 April 2015].
- BURTON, A., 2007. *The Haven of Peace purged: tackling the undesirable and unproductive poor in Dar es Salaam, ca. 1950s-1980s*. The International journal of African historical studies, , pp. 119-151.
- Calvert, P. et al., 2004. *Ecological sanitation - revised and enlarged edition*, Uno Winblad & M. Simpson-Hébert, eds., Stockholm: Stockholm Environment Institute.
- Centre for community Initiatives Tanzania (CCI). Available from: <<http://ccitanzania.blogspot.fi/>>. [28 October 2014]
- CCI, 2014. *Construction of Pilot dry toilet (EcoSan) by using plastic bottles at Keko Machungwa in Temeke Municipal*, Dar es Salaam.
- City Mayors Statistics, *The world's fastest growing cities and urban areas from 2006 to 2020, Fastest growing cities and urban areas (1 to 100)*. Available at: <http://www.citymayors.com/statistics/urban_growth1.html>. [23 January 2015]
- Cupers, Kenny & Isabelle Doucet, 2009. *Agency in architecture: Reframing criticality in theory and practice*, Footprint 3.1, 1-6.
- Davis, Mike, 2006. *Planet of Slums*, Paperback edn. New York: Verso.

- de Beauvoir, Simone, 1958. *Mémoires d'une jeune fille bien rangée*, éd. Gallimard, Paris.
- De Carlo, Giancarlo, 1969. *Architecture's public*, Published in *Architecture and participation*, 2005.
- Eawag/Sandec, 2008. *Sanitation Systems & Technologies*. In E. Tilley & S. Peters, eds. *Sandec Training tool 1.0 - Module 4*. Eawag/Sandec (department of Water and Sanitation in Developing Countries).
- Giddens, Anthony, 1984. *The constitution of society: Outline of the theory of structuration*, Univ of California Press, 14.
- Grin, John, & Robert Hoppe, 2000. *Cultural bias and framing wicked problems, Government Institutions: Effects, Changes and Normative Foundations*. Springer Netherlands, 179-199.
- Gugu, Faith., 2011. East Africa Practitioners Workshop on Pro Poor Urban Sanitation and Hygiene. In *Financing sanitation in Dar es Salaam - Current challenges and the way forward*, Kigali, pp. 1–8. Available at: <http://www.alnap.org/pool/files/proceeding-eastafricanpractitionersworkshop-2011.pdf&ei=K-TIVP7BNOLXyQPszoCYAg&usg=AFQjCNHhtzf_XaGzIwNbuBThOpxvc3DZ8Q&sig2=BmdU>.
- Guzman Figueroa, Nathaly, 2015. *Stakeholder collaboration in community-based organizations (CBOs): The case of a sanitation CBO working in Dar es Salaam, Tanzania*, Master of Science in Economics and Business Administration. Masters thesis. Aalto University, Helsinki.
- Hamdi, Nabeel, 2004. *Small change: About the Art of Practice and the Limits of Planning in Cities*, London: Earthscan.
- Jacobs, Jane, 1970. *The economy of cities*, Jonathan Cape.
- Jenkins, Joseph, 2005. *The humanure handbook, A guide to composting human manure*, 3rd Edition.
- Kawulich, Barbara B., 2005. *Participant Observation as a Data Collection Method*. Forum Qualitative Sozialforschung / Forum: Qualitative Social Research, [S.l.], v. 6, n. 2, May 2005. ISSN 1438-5627. Available at: <<http://www.qualitative-research.net/index.php/fqs/article/view/466/996>>. [10 December 2014].
- Kebede, A. S. & R. J. Nicholls, 2011. *Population and assets exposure to coastal flooding in Dar es Salaam (Tanzania): vulnerability to climate extremes*, Report submitted to the Global Climate Adaptation Partnership (GCAP), University of Southampton, School of Civil Engineering and Tyndall Centre for Climate Change Research, UK, 26 pages.
- Kiunsi, Robert, 2013. *The constraints on climate change adaptation in a city with a large development deficit: the case of Dar es Salaam*, *Environment and Urbanization*, 25(2), pp.321–337. Available at: <<http://eau.sagepub.com/content/25/2/321.abstract>>
- Koolhaas, Rem, 2014. *toilet*, In B. Davis et al., eds. *Elements of Architecture*. Marsilio, pp. 1102–1272.

- Kossak, Florian, et al. 2009. *Agency: working with uncertain architectures*, eds Routledge, 2009.
- Langergraber, G. & E. Muellegger, 2005. *Ecological Sanitation—a way to solve global sanitation problems?*, *Environment international*, 31(3), pp. 433-444.
- Lefebvre, Henri, 1974. *La production de l'espace*, *L' Homme et la société* 31.1: 15-32. translated to english in 1991.
- Lüthi, Christoph et al., 2011. *Community-Led Urban Environmental Sanitation Planning (CLUES)*, p.100.
- Matyelele Msyani, C., 2013. *Current Status of Energy Sector in Tanzania: Executive Exchange on Developing an Ancillary Service Market*. Washington D.C., p. 21. Available at: <[http://www.usea.org/sites/default/files/event-/Tanzania Power Sector.pdf](http://www.usea.org/sites/default/files/event-/Tanzania%20Power%20Sector.pdf)>. [17 February 2015].
- Mazwile, M., 2013. *Community Infrastructure Upgrading Program (CIUP): Local Action for Resilient Urban Infrastructures in Dar es Salaam*, In *The local Climate Solutions for Africa 2013 Congress - Dar es Salaam - Reality Check Workshop* - hosted by GIZ and Dar es Salaam City Council.
- McIntyre, Alice, 2008. *Participatory action research*, Vol. 52. Sage.
- McKean, John, 2004. *Giancarlo De Carlo: Layered Places*. Axel Menges.
- Meadows, Donella H., 1999. *Leverage points: Places to intervene in a system*, Hartland, VT: Sustainability Institute.
- Meadows, Donella H., 2008. *Thinking in systems: A primer*, Chelsea Green Publishing.
- Miller, Miriam, 2015 . *Kinshasa: Sanitation Status*. Available at: <<http://www.iwawaterwiki.org/xwiki/bin/view/Articles/23%29+KINSHASA+%28Democratic+Republic+of+Congo%2C+DRC%29+3>>. [8 April 2015]
- Mostafavi, M. & G. Doherty, 2010. *Ecological urbanism*. Lars Müller Publishers Baden.
- Mwanakombo, M., 2013. *Community based Sanitation Program*, In a Presentation to Aalto University Students. Dar Es Salaam.
- NBS (National Bureau of Statistics) & OCGS (Office of Chief Government Statistician, Zanzibar), 2014. *The 2012 Population and Housing Census: Basic Demographic and Socio- Economic Profile; Key Findings*. Dar es Salaam, Tanzania: NBS and OCGS. Available at: < http://nbs.go.tz/nbs/takwimu/census2012/Basic_Demographic_and_Socio-Economic_Profile_PopularVersion-KeyFindings_2012_PHC_EnglishVersion.pdf>. [17 February 2015].
- NBS & OCGS, 2014. *The United Republic of Tanzania, Basic Demographic and Socio-Economic Profile - Statistical tables - Tanzania Mainland*. Available at:<http://www.tanzania.go.tz/egov_uploads/documents/Descriptive_tables_Tanzania_Mainland_sw.pdf>, [17 February 2015].

- NEMC (National Environmental Management Council), 2009. *Dar es Salaam river basin management project. A draft project concept*, NEMC, Dar es Salaam, 52 pages.
- Pan-African START Secretariat et al., 2011. *Urban Poverty & Climate Change in Dar es Salaam, Tanzania: A case study*.
- Parkinson, J., 2014. *City sanitation planning, Introduction to Urban Sanitation Planning*, Module 1.2. Planning and designing of sanitation systems and technologies. Lecture conducted from EAWAG Aquatic research at Ecole Polytechnique Fédérale de Lausanne.
- Penrose, K., M.C.D. Castro, J. Werema, & E.T. Ryan, 2010. *Informal Urban Settlements and Cholera Risk in Dar es Salaam, Tanzania*, PLoS Negl Trop Dis, 4(3), pp. e631.
- Rittel, Horst W.J. & Melvin M. Webber, 1973. *Dilemmas in a general theory of planning*, Policy Sciences, 4.2, pp.155–169.
- Rockefeller, Abby. A., 1996. *Civilization and Sludge : Notes on the History of the Management of Human Excreta*, Current World Leaders - International issues, 39(6). Available at: <<http://www.tandfonline.com/doi/abs/10.1080/10455759809358806>>.
- Salmon, Katy, 2002. *Nairobi's 'Flying Toilets': Tip of an Iceberg*, Terra Viva (Johannesburg), 26 August 2002; Mutevu, "Project Proposal on Health and Hygiene Education."
- Salovaara, Janne J., 2014, *Sustainability 2.0*, A sustainability Community, Sustainability 2.0, Available at: <<http://ascry.fi/sustainability-2-0/>> [10 January 2015].
- Sanders, Elizabeth B-N., & Pieter Jan Stappers, 2012. *Convivial toolbox: Generative research for the front end of design*. BIS.
- Schalk, Meike, 2007. *Urban Curating: A Practice of Greater Connectedness*, 153-165.
- SDI (Shack/Slum dwellers international). *What we do*. Available from: <<http://www.sdinet.org/about-what-we-do/>>. [28 October 2014]
- SDI. *Making cities inclusive. Our methodology*, Available from: <<http://www.sdinet.org/method-inclusive-cities/>> [28 October 2014]
- Smith, Hazel, & Roger Dean, 2009. *Practice-led Research, Research-led Practice in the Creative Arts*, Research Methods for the Arts and Humanities, Edinburgh: Edinburgh University Press.
- Spatial Agency, Available at: <<http://www.spatialagency.net/database/shack.slum.dwellers.international>>. [12 February 2015].
- Trémolet, S. & D. Binder, 2013. *Evaluating the effectiveness of public finance for household sanitation in Dar es Salaam, Tanzania*, London, Available at: <http://www.shareresearch.org/localresources/public_finance_effectiveness_households_tanzania.pdf>.

UN, 2013. *Ensure Environmental Sustainability by 2015*. Available at: <http://www.un.org/millenniumgoals/pdf/Goal_7_fs.pdf>. [29 January 2015].

Un-Habitat, 2003. *The Challenge of Slums - Global Report on Human Settlements*, Earthscan Publications. Available at: <<http://www.unhabitat.org/pmss/listItemDetails.aspx?publicationID=1156>><http://www.loc.gov/catdir/toc/ecip045/2003013446.html>.>

Un-Habitat, Cities Alliance & Dar es Salaam Local Authorities, 2010. *Citywide Action Plan for Upgrading Unplanned and Unserved Settlements in Dar es Salaam*, Nairobi.

United Nations, Department of Economic and Social Affairs & Population Division, 2014. *World Urbanization Prospects: The 2014 Revision, Highlights* (ST/ESA/SER.A/352).

UN, *Millennium Development Goals and beyond 2015. Goal 7: Ensure environmental sustainability*. Available from: <<http://www.un.org/millenniumgoals/envIRON.shtml>>. [8 April 2015].

UN, *The Human Right to Water and Sanitation: Media Brief*. Available from: <http://www.un.org/waterforlifedecade/pdf/human_right_to_water_and_sanitation_media_brief.pdf>. [8 April 2015].

Valente, Tom, 2010. *Diffusion of innovations*. Lecture conducted at University of Southern California. Available at: <<https://www.youtube.com/watch?v=ZG9dAIBd4xQ>>. Accessed 28.02.2015.

Watkiss, P., T. Downing, J. Dyszynski, S. Pye et al., 2011, *The economics of climate change in the United Republic of Tanzania*, Report for Development Partners Group and the UK Department for International Development, January, Available at: <<http://economics-of-cc-in-tanzania.org/>>, 34 pages.

Werna, E., I. Blue & T. Harpham, 1996. *The changing agenda for urban health*. Michael Cohen et al, , pp. 201.

WHO (World Health Organisation)/UNICEF, 2008. *A Snapshot of Sanitation in Africa - A special tabulation for AfricaSan*. In AfricaSan: Second African Conference on Sanitation and Hygiene. Durban.

WHO/UNICEF, 2010. *Progress on sanitation and drinking-water*, Available at: <http://whqlibdoc.who.int/publications/2010/9789241563956_eng_full_text.pdf>

WHO/UNICEF, 2014. *Progress on drinking water sanitation - 2014 update*. Monitoring Programme for water supply and sanitation, pp.1–78. Available at: <http://books.google.com/books?hl=en&lr=&id=irXCej15ax8C&oi=fnd&pg=PA56&dq=Drinking+Water+and+Sanitation&ots=nB6oNXONjK&sig=ccf20ooYv9F1SWv_miDYvNkEAs>. [23 February 2015]

WHO/UNICEF & JMP. *About the JMP, Mission and Objectives*, Available from: <<http://www.wssinfo.org/about-the-jmp/mission-objectives/>>. [8 April 2015]

WHO & IRC Water and sanitation Centre Geneva, 2003. *Linking technology choice with operation and maintenance in the context of community water supply and sanitation: A reference document for planners and project staff*, Available at: <http://www.who.int/entity/water_sanitation_health/hygiene/om/wsh9241562153.pdf>.

WHO. *Health Topics. Sanitation*. Available from: <<http://www.who.int/topics/sanitation/en/>>. [8 April 2015].

WorldBank, Available at: <<http://water.worldbank.org/shw-resource-guide/promotion/hygiene-promotion-approaches/phast>>, [16 January 2015].

APPENDICES

1. PRACTICE LOGBOOKS, REFLECTIONS, DOCUMENTING PHOTOS

Characters (from left to right):

- ~ Husna Seif Schechonge: PHAST UJENZI group leader
- ~ Peter Mtui: CCI engineer and local project coordinator
- ~ Johnny Viktar Haule aka. CTN: leader of Keko Youth group
- ~ Ima: local mason, technician, member of PU
- ~ Mr. Shyo: street officer, member of PU
- ~ Chris: member of Keko Youth group, studied journalism
- ~ Hasma: member of PU
- ~ Zaitouni: member of PU
- ~ Josiah Msamba: filming crew assistant
- ~ Farida: member of PU, accountant

~ Hezron Magambo: CCI, environmental engineer and project coordinator.

PILOT CONSTRUCTION, Day one, Monday 14.4.2014.

Goals: reconnect with Phast Ujenzi, introduce the project's goals for the year and look at the site for the Pilot.

First, workshop with Phast Ujenzi in Keko Machungwa.

The discussion is very fruitful. I explain the business plan and the main activities it involves as well as which activities will be introduced during the Pilot workshop, in form of trainings.

Once I have introduced them the bottle wall technique as being the technique that will be used for the Pilot, PHAST UJENZI gets really interested and curious. They are trained builders. Their questions are numerous. They are worried about the safety and are curious about the steps of construction with the bottles.

“Is it stable?”

-Is the toilet going to be built entirely with that material?”

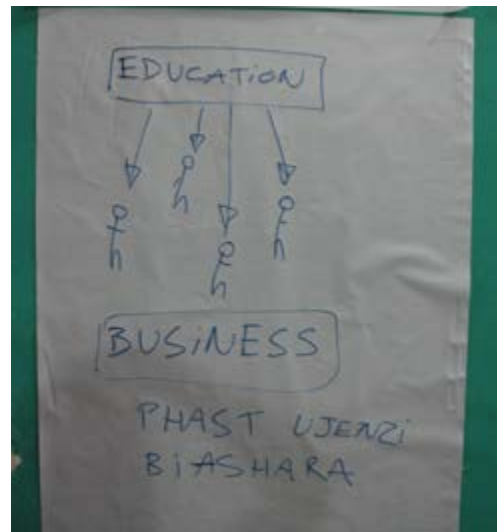


They are mainly asking how exactly the construction will proceed. They want to have a clear picture in their head about how we will build it. I explain them the different steps. They are doubting that we can build the foundations with the bottles. I explain all the construction steps carefully. At the end of the session most questions are answered and PHAST UJENZI is convinced.

Second, visit to the Pilot site (my last visit was a bit more than one year ago, in March 2013).

At first glance some things have evolved towards the common plans forged last year with Phast Ujenzi and CTN (the owner of the house and leader of Keko Youth group): His plot seems greener; some more crops have been planted in a quickly defined and protected area and in the back of the house - where we last year were presented the fish pond - CTN has realized his plans of having some poultry; he now has chicken, a very nice and proud cock, some Guinea Fowls, ducks and a tortoise and of course the fish pond. On the front of his house the words "Keko Machungwa youth center" have been painted, the painter forgetting the word "youth" and adding it in the bottom.

We are deciding where the toilet will be built exactly and we are also trying to gather as much information on the house, plans, inhabitants, site specifics as possible. For the construction there are two options: the place of the collapsed pit latrine and a space just



under to the West,

closer to the house also closer to the river.

The decision for the construction site is done rather easily. It had been raining today - the



water table is just under the surface of the ground and even visible from in front of CTN's house. It seems more sensible to build further up, so, on the collapsed toilet's place. When Hasma digs a hole on the lower site available, it instantly fills with water. It is quite clear that we need to build a bit higher. CTN and Phast Ujenzi are now in charge of making sure we can build on the collapsed toilet's spot. Its place is at the corner of CTN's site limits and allows to not lose space. Just above the collapsed toilet remains a piece of wall which will be extended and will help direct water away from the toilet.

Remain few open questions. How big does the toilet need to be? Can the collapsed toilet really be demolished and the new one built on the same spot (is it stable enough) and is there enough time and people to do the job?

I learn that the youth centre is hosting 32 boys all the time and 15 more during the day in a more sporadic way. It makes a big difference from the assumptions I had of 10 dwellers. I guess better communication would have been helpful in finding out earlier! In the future he is also planning to have one more building "a hostel", to expand his youth centre activities. I decide to include the toilet plans into his plans for the future and will plan the toilet considering the hostel as well as current and future number of site dwellers.

The hardest part of the day, was when I presented the Pilot materials and design to PHAST UJENZI. It felt at first as if they were from first base sceptic and I had to really convince them about the rightness of the choice, even though the bottle-wall technique was their wish and idea. I tried to explain the choices in very simple ways, down to earth. But they even understood the aesthetic choices.

Day two, Tuesday 15.4.2014.

Yesterday payed 12000 Tsh for an internet bundle from Vodacom, that was supposed to work a week and it worked only for a day.

Meeting at CCI office with Tim Ndezi.

-Arrival at CCI office 09:45.

-Arrival of Tim Ndezi 11:45.

-Departure from CCI office 14:45.

Discussion on the appropriate size of the toilet with the help of Muhina (professional builder from the Chamazi community). The faecal chambers need to be 1,20 meter by 1,20 meter and 90 cm high. There will be 4 chambers to match the number of users. Muhina related to another project in Moshi where a toilet with 4 chambers was built for 45 people. It should be the right size for our Pilot. We don't have time to calculate more accurately. More important is to build and that Phast Ujenzi learns the new techniques. We settle for 4 chambers. The rest is yet to be drawn and decided.

I am still in doubt about what material to use on top of the base. I still have two options in mind: Makuti which are coconut leaves bundled together and usually used on roofs, or Mabanzi which is rest wood (the outer layer of the trunk when it goes to get cut).

Day three, Wednesday 16.4.2014.

Drawing the "4 chamber Pilot" at the hotel.

Meetin with Said (local architect and site coordinator) to help me determine the materials for the Pilot:

-find out which materials are needed where

-their price

-make quotation

We are able to name and size all materials for both options (Makuti and Mabanzi). But I still have to draw them on the plans for the quotation and send it to Said. Said tells me he thinks that a lot of the things in design are very different from what he knows and the way people build here. But he also says that he thinks it is good quality and but might be hard to convince people about some things. Especially about Makuti as it is a very light material and usually used for roofs. Using it for walls in a slum, for a toilet might be problematic. He is worried about the durability also.

We decide to meet again and with some local craftsmen so I can learn more about those materials.

For the construction we still don't have a facilitator for teaching those two materials either.

Day four, Thursday 17.4.2014.

Education workshop @ Keko Machungwa.

Had to squeeze in two days of workshops in half a day, which included trainings on business, construction, urine collection and use, and compost.

Phast Ujenzi raised some relevant issues about the toilet design currently used by the group: people are using the urine hole as the wash hole, which means there is no urine diversion happening. We tried to look at the design and see what could be done to improve it. Some ideas were drawn and we decided to focus on the new design which should tackle the problem and decided that the group will try to find a solution on their own so that urine could be collected from the designated basin and a washing space could be added with some additional basin.

I introduce the new design on the white

board and realize some faces are confused. I then take a new sheet and place it on the ground and draw the interface on the ground so I can demonstrate by acting the different steps of the toilet use. Faces shine of comprehension again.

On the new toilet design and space PU asks if two holes will be in use during the same period. I realize I hadn't thought the space completely through. If people were to use two holes at the same time there would be a need for some kind of separation between both holes so two people could use the toilet at the same time without giving up privacy!

So we redraw the toilet space in 10 minutes. Ideas fuse!

“We need two doors.

- Why are the stairs like this?.

- Why couldn't we have the stairs like that?

- What material are the stairs?

- A ramp would be good, accessibility is very important”.

I think, explain and we agree to the version. I will later draw and we then will build. This was the most efficient participatory planning session.

The whole day in general was very fruitful but intense and hard. We managed to squeeze in all information PU needed to hear and are set for starting the week end.

Day eight, Monday 21.4.2014.

After drawing all week-end I finally have a final draft of the toilet for making the material cost quotation. Peter our project engineer sits down with me to look at the drawings (which I only have on my computer screen

for lack of time for printing). I manage to explain the main things about the drawings.

I decided to only draw one option, in Mabanzi, following advice from Said who thought Makuti was not going to be easy to sell to the future toilet users who talk a lot about durability.

“Things need to be strong”.

It happened to be a good choice once we started building the first Mabanzi wall, I got many comments

“It is very strong.

- It will hold for a long time”

and people smiling looking happy about that very fact.

At that point I have managed to draw all plans at scale 1:20 with all dimensions and all materials visible. The detailing was not possible in such a short time. The construction will have to be done in a very collaborative way and I will have to supervise a lot as the drawings are not finished 100%. I have intentionally left out some details like the urine and washing basin details as I am expecting that PU knows how to make those and I want them to tell me how it is done. But most of the details are quite clear in my head and should go according to the plans.

Once we have the quotation the next morning we can go buy material too. I am very curious about buying all this material as I have no idea where and with whom I am going. I have asked Said our local architect and site conductor to be present and also asked to have some of the women with me, since they must know where to get the material.

Day nine, Tuesday 22.4.2014.

At CCI office at 10:00 to get the money for

material shopping and print the quotation, out at 11:45.

13:30 @Keko Machungwa: Signing in at the street officer's place. Today I am accompanied by Zaitouni a woman from PHAST UJENZI, Husna's daughter Tuma, and Josiah from the filming crew.

We reach Keko Magurumbasi at 14:30. The first shop is where we will buy all hardware and special material: PVC pipes, hammers, shovels, nails, hoes, pickaxe. The shop is very small but seems to have everything necessary from cement to door hinges and shovels.

We are also looking to buy some wood, softwood for the toilet's walls for that we are heading to Keko Toroli. Still on board of our white 7-seater we reach destination at what looks like a real life Emir Kusturica movie set; the ground is black from all the decomposed wood and the grey sky is retaining a heavy load of water, waiting to fall any second. The whole area of Keko Toroli is one big wood market. Each house front, or almost, exhibits wood products for construction or furniture, softwood, hardwood, expensive, treated or untreated, local sawmills. The wood dealers reach us in a heartbeat and offer us their prices sometimes ridiculous (my presence as a “Msungu”, white person is quite effective). We prefer to have a look at various offers and not agree to the high prices. Finally after 1 hour of handling and discussing we get a reasonable offer, the dealer guides us to his shop which happens to be the first one that we stopped at! The wood is bought and loaded on the first shop's Tuk-tuk, which will go fetch the rest of the material on the way back to Keko Machungwa's federation office.

A fascinating experience and also frustrating because of the attitude of certain wood dealers, now I know that it is better to not show



Filling of bottles for the toilet base @ Keko Juu football ground.

Before my arrival in Dar I requested that PU will start collecting bottles. I was told they had started, but when we arrived at Keko Juu on that day CTN had just come back from buying 1000 bottles of 0.5 litres from a local person who collected them to sell further on to the Chinese clothes industry. The cost for the 1000 was 25000 Tsh, which is approximately 11 euros.

The filling could start, later than planned but



at least we started. Between the first workshop and now I also had asked that Chamazi people would be somehow involved in teaching PU how to fill the bottles, which had



been done, luckily.

The first hour of the day saw only 5 people slowly arriving for filling. Until the last hours of work we had reached 30, including PU, local authorities, passer-bys, boys from the youth centre, CCI members and me. The atmosphere was very positive and motivated, there was a lot of laughing and joking. We finally filled 1002 bottles by the end of the day.

Even though some of us knew very well how to fill bottles properly and tightly many bottles were not filled as expected. It would be important to have instructions for everyone to hear at once and personal instructions and verifications during the process to ensure that they are filled properly.

Due to an inconsequent way of working we were obligated to review most of the bottles, that were not tight enough or whose caps were not screwed down as tight as possible. We lost a lot of time and some money because of the mistake.

During the day different personalities were uncovered. Chris one of the young men from the youth centre turned out to be a very trustworthy organiser and an example to the rest of the boys. Mr. Shyo the street officer, a bit of a show-off and true politician, CTN a leader by example.

Day eleven, Thursday 24.4.2014.

Bottle filling and foundation @ Pilot site.

While the boys of the youth centre were filling the rest of the bottles, PU, Peter and I were starting the foundation pit for the toilet.

A small discussion with Peter provides more insight on the orientation of the toilet. We decide that the stairs should be on the other side to the north as to the south there is the

window of the neighbouring house, which might create some problems of privacy in the long run. I therefore change the plans according to that.

As previously mentioned the drawings for the toilet took into consideration the future plans of the house owner to build a hostel on his plot. The toilet will be at the South-east corner of the plot, this way the inside space of the plot can be reserved for gardening and the hostel, on top of that the toilet and hostel roofs can be later combined to collect rain water.

While Ima and some of PU's members were laying the foundation, Husna, Peter, Josiah and I went for more shopping. This time to buy aggregate, wire-mesh, sand and more tools.

The day was slow and quite disorganized. I was relying too much on Peter who basically didn't have much clue on anything, at least no more than I did. For the next day I decide to put Chris with more organisational responsibilities for taking care of the bottle filling with the boys and I decide to rely on myself and ask Peter to assist me if any need especially for translation rather than relying too much on him.

Day twelve, Friday 25.4.2014.

All day was spent at Keko Machungwa.

The boys didn't have any additional bottles to fill that day. CTN didn't manage to find a seller.

I was redrawing the plans, basically mirroring the toilet so the stairs would be on the north side instead of the South.

Peter had a strange attitude towards me. As if I was under his command.

It appeared that the previous day a few

misunderstandings had occurred. It was not understood neither from Peter nor from Ima the builder that the foundation was planned to be made of bottles like the rest of the base. Even though I inquired what Ima was doing Peter, translated to me that the foundation will be made as the plan was saying. I believed it, but the next day I discover that the foundation were continued and made with the local cement blocks. I guess Peter hadn't understood my question in the beginning and had translated Ima's answer in words that made me think that they were going to follow the plan. So PU had laid the foundation with cement blocks as we arrived in the morning. It seemed strange to me

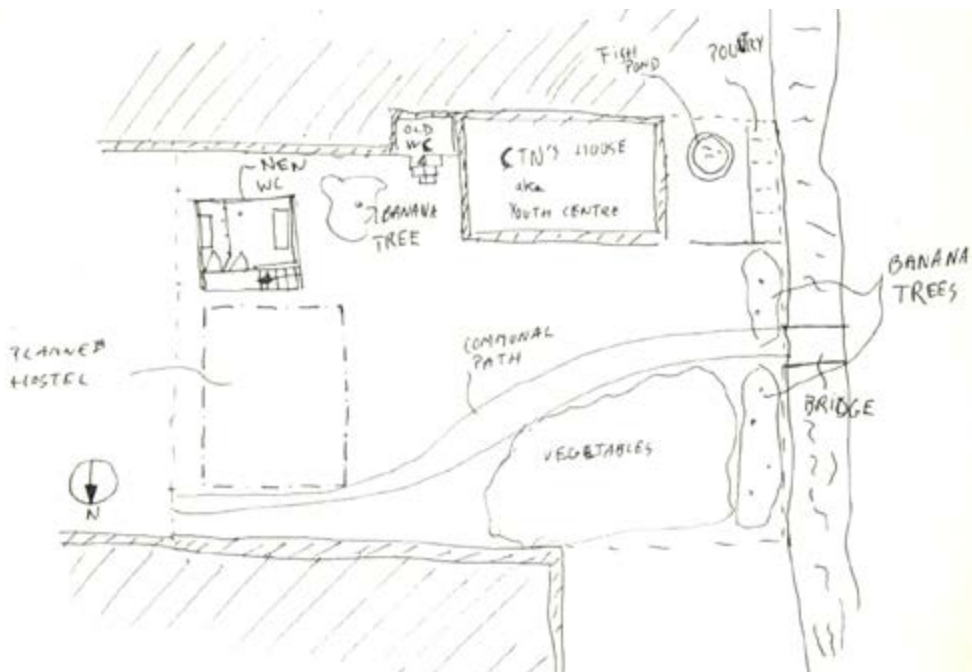
with the slab pouring.

Next time we will try with a bottle foundation!

I requested that the slab concrete was to be mixed with clean water and not with water from the fish pond which is directly connected to the creek and its filthy water.

Some things like that, which cost more than directly available resources are difficult to teach as people don't have much money they prefer what is easy and readily available to things they would have to pay for.

Mistakes will always happen it is a matter of how you deal with them and what you learn from them.



as I thought Ima had understood the plan. But the misunderstanding had happened and PU had worked for three hours already before our arrival and as we were running out of time for the construction in general I decided to leave it as it was and proceed

Day thirteen, Saturday 26.4.2014.

@ the site to gain the time lost during the Easter holidays.

Took all day for Peter and I to print the plans.

By the way printing is so much more expensive than copying!

Muhina (technician from Chamazi community) was at the site when we came back. We showed him the plans to get his last feedback. He is concerned about the ventilation and proposes we add one more for adequate ventilation. It is a challenge again to explain why things are planned the way they are and why it should be kept the way it is drawn on those papers. I manage though, no problem. And if there was something I would have missed or didn't have time to plan thoroughly I would for sure take the comments and make changes.

Otherwise the concrete slab was curing, after we covered it with sand and water for a better process.

Day fifteen, Monday 28.4.2014.

The daily allowances for the construction participants is 5000 Tsh for non federation members and 7500 Tsh for federation members (PU), on top of this 2500 for the lunch and 1000 Tsh for the tea per person, the total amount of money is usually given to the participants directly, as some prefer to buy their own food or give the money to their families, but for the sake of a good construction site atmosphere I preferred to pay the participants only their allowances directly and the lunch and tea money to be given to those who prepare it. That way all participants are eating at the same time, in the same place and informal exchange between the participants is easier as well as very beneficial. All along the construction it has proven to work rather well although some were complaining with more or less humour that there was not enough in their plates considering the hard work.

That day Peter and Said (local architect)

were hunting for affordable material (wood, Mabanzi) from morning to evening and were joined by Husna later during the day. Their task was to buy all missing material for the rest of the construction: wood, cement, sand aggregate, tools, ropes etc...

@ the site we lay 5 rows of bottles and leave them to dry until the next day. Muhina is helping, last year he learned how to make a piece of bottle wall with the group of students from Aalto University. He supervises the progress of the first layers. We started off with laying the bottle in quincunx, when reaching the second layer and the door opening of the chamber we realize that if the layers continue to be laid that way we will end up with a pyramid-like wall. I make the remark to Muhina and we change, to lay the bottles on top of each other.

Each layer and almost each bottle need to be levelled, Ima and Joseph are advancing fast, maybe too fast for the layers to really be aligned properly.

I observe that the women are too often observing or doing the simplest tasks. By lack of confidence or lack of feeling included. Ima the "builder" as they call him is working along mostly with one of the men Joseph and not proposing or explaining things to the women, although his role as a sort of construction teacher is very important. He is also not considering the plans, nor asking questions he prefers to work his way, quickly rather than discussing issues and the plans. There were quite a few mistakes during the process that could have been avoided with better discussion.

On the other hand CTN, who I later discover is a level two carpenter, is looking for the discussion and to learn new things and to understand. He asks and double-checks with me during the construction, to make

sure all is fine and following the vision. As I had repeated a few times, the plans were what they were and the level of detailing quite poor, which necessitated discussion and questions, it worked with some and was impossible with others, maybe their sense of pride or simply habits.

I realise that more detailed plans would be preferable, but the lack of preparation time made it impossible and even with very detailed plans there might have been things in the construction that I had planned to be a certain way and the locals would have the experience of a different way that I wouldn't know of and to follow plans rigorously might have been a complete mistake. The way things happened were not ideal but at least it allowed for discussion, or it appealed for discussion rather than stubborn plan application.

The situation suited some and was very difficult with other participants. Maybe a short clarification of the situation in the beginning would have been a good idea, although I did tell PU, Ima and Peter repeatedly that the plans were not complete and needed double checking during the construction process.

Day sixteen, Tuesday 29.4.2014.

Today we are laying three more layers of bottles and attaching the previous ones together with rope. I start with that and try to find the pattern. Farida then takes over after some explanation. She picks up the idea rather fast and will be doing most of the tightening today, meanwhile Ima and Joseph are putting the rest of the bottle layers on top.

We are starting to assemble the Mabanzi walls today, that is when I learn that CTN is a trained carpenter! We discuss the plans together before starting the assembly. He

tells me the way it is planned is unusual and tries to explain how he would do it, I tell him that the walls are independent and are to be considered as panels that are mountable and demountable individually. It will make things easier for placing the walls on top of the base and as well to replace parts later on if there are some damages.

Day seventeen, Wednesday 30.4.2014.

That day Farida teaches the other women how to tighten the bottles with rope. Some get it some not so much. I feel like I should never stop telling about how quality is important and work well done helps the final structure hold longer and make sense.

Day eighteen, Thursday 1.5.2014.

It's a hot, sunny and long day at the site. The accumulated hours of lack of sleep are hard to hide. We are all a bit tense and on the edge, but still concentrated.

Chris cut his finger quite deeply. He is in pain but regains courage soon. Husna pays a visit and will be with us all day. She hasn't



been at the site much due to her many roles within the federation. She is in charge of enumerations in the whole of Dar es Salaam practically. But today she is shining and full

of energy!

All bottles are in place, as well as the holes for the pipes, the base is only missing the walls for the stair support.

Assembling Mabanzi walls and preparing the wood works for casting the concrete slab. I realize there should be ready sizes of concrete casting wood planks for the future casts in order to avoid wasting wood and wasting time. If we standardize the size of the chambers in two or maximum three different sizes for example it would make a lot of sense for the future 19 toilets to be built this year.

Almost all Mabanzi walls are ready and we are missing some more material to finish off. Sadly we are behind schedule and won't be able to finish the toilet before I leave back to Helsinki.

Later that day the walls for the landing's support will be elevated (with 5 layers) and all four chambers have their wood works ready to receive the concrete. We still need to draw the toilet interface with the right dimensions and place all the necessary pipes. Too many layers of bottles are placed rather quickly and the walls are unlevelled. Difficult to have to remind about the quality work again so I let them proceed. Even Peter doesn't seem to care too much about the quality. He wants the toilet to be finished on time as I wished. But it just feels wrong now to do things quickly so I can see it finished.

Ima struggles a bit because of the unfinished plans and missing dimensions. He is trying to draw the toilet space on the wood but is not able to do so since my plans are missing the information he needs. I have to draw the space again and add the dimensions during the process. Understandable, since we only a few hours ago drew the space on the sand and agreed on the approximate size of it

and there was no other plan than the sand drawing.

Day nineteen, Friday 2.5.2014.

Rainy day.

I experienced corruption in the morning. Our Bajaji had to pull over after a Policeman had stopped us and climbed aboard and told the driver he cannot circulate here because it's the centre. It wasn't the centre at all. After some verifications and the Policeman finding out the Bajaji is owned by a government official he abandoned his quest and asked the driver to pay him 10 000 Tsh.

We arrive late at the site.

Peter is in the city buying more Mabanzi and the rest of the missing material.

Temeke Municipality officials are at the site when we arrive as well as two journalists from TV1 Habari: <https://www.youtube.com/watch?v=H04vY4TW23w>



We need to place the pipes and pour the concrete slab today. Fatigue makes things go a bit overboard and people's comprehension reaches limits. Ima wants to work fast regardless of the current lack of planning

and understanding. I am trying to explain how the pipes need to be inserted in the wood boards through a bored hole. In my idea they need to go through the slab and have few centimetres visible under it, so that an elbow or “T” can be attached. I explain the idea but Ima wants to simply place them on top of the boards and doesn’t seem to understand why I want the pipes to be longer under the slab. We argue slightly and I get intense; it is a really important part of this toilet as it will be decisive for it to work or not. I want to make sure it will be done properly and in a way that the parts can be exchanged without having to destroy the slab. In my eyes it is better to be able to replace pipes if they are broken then to pour all parts into the concrete, thus disabling their easy replacement. We finally find a common ground before I lose my mind and Ima seems to have finally understood my point, he explains that the pipes will be placed on top of the boards, so no need for making any holes, but the concrete around the pipes will be loosened and when the slab has dried and the boards are removed, they will pour the floor layer and the pipes will be placed so that there are a few centimetres under the slab and the pipes are tightened to the floor layer. Luckily we managed to understand each other before mistakes could be made.

Due to rain and lack of material we will have to do the pouring the next day. But the matrix is almost ready. The Mabanzi walls are also

almost ready and their assembly was easier than the base and slabs. Strengthening my concrete works knowledge a bit would be a good idea so I can be a better guide or adviser.

Day twenty, Saturday 3.5.2014.

Last day.

The previous day ended really late, spending 5 hours in traffic and Benjamin getting his phone stolen while chatting from the car in traffic. The phone was later found, and brought by CTN (who we then started calling “the king of the jungle”) to our hotel around 2:00am.

Josiah, Peter and I didn’t sleep much and Ulpu left to Finland. At the site we need to pour the concrete slab and finish the wall’s assembly. Today I get a new surprise. The place for the stair landing has been prepared for casting, even though the plans tell that it is supposed to be wood. I enquire from PU and Ima, then ask for explanation on what they are planning to do here, “pour concrete”. So I explain that the drawings plan a wooden landing, Ima responds “but wood is not going to hold durably”. Once again he preferred to follow his instinct or assumptions rather than following the plan or even asking or discussing. I tell them they have to take the wood boards away.



In the meantime the boys and PU are preparing the steel bars and mixing the concrete.

When pouring the slab and levelling it, Peter and I find pieces of glass, plastic, and other unwelcome elements. It will be useful to have a few words about quality next time I visit. It is important that they learn how to work at the height of their expectations, for themselves and the quality of their constructions.

After the slab has been poured I enquire about the toilet interface and the technique of its construction. Ima shows me how they are used to proceed. I am satisfied with the technique and it will be made that way and added to the construction guide.

When we leave the site: the chamber walls are finished, the slab is curing. The stairs, landing, separation wall, Mitete (bamboo) mesh, all pipes, toilet interface, flooring, doors and protection wall need to be built.



Pilot construction reflexion:

During the whole process I really appreciated working with CTN, the dialogue and the questions he was raising were really constructive and sometimes even instantly helpful! The first day where we started with assembling the wood walls he first said he had an education in carpeting but then also had some remarks about the whole structure itself which made me think of my design

decision more carefully and why's of that decision. His remark was very valid and I really appreciated it as I went on to explain why I had made the decision of planning the walls as prefabricated panels. He also made some comments on connections between the walls and the base (which I had thought to have planned through) but it came out that his comment made us avoid a big mistake. He commented that the walls need some sort of anchoring when I thought that gravity will do! Hmmmmm! So I kept thinking about it and then realised that if only using gravity as anchoring the post between the two doors will be lose, I told him that "great you were right" so lets do it so that we make some small socles in which we place the walls. And they have to be on a higher level than the bathroom floor so that water doesn't get in the holes.

PLANNING, DETAILING AND GUIDING FROM A DISTANCE.

Monday 5th to Friday 23th of May 2014.

Now that I am back in Helsinki the construction has to continue without me and Peter will be the one in charge of the good progress of the project. The idea is to draw all the details before the construction starts again. There will be one week of break for the slab to cure and I need to send a schedule of the construction to Peter.

The first week I am really worried that the construction is carrying on in a disorganized way, with me having no contact to Peter or anybody else. After I returned home on Sunday the 4th of May I didn't get any news from Peter, any replies to my emails. Finally at the end of the week on Friday morning the 10th of May I call Peter and manage to talk to him. His computer was broken. I already imagined the construction carrying on with Ima doing as he pleases and nobody leading the



way or anybody taking care of the quality of the work or following the plan (plans which they don't even have yet, as I have to revise them and draw details).

13.5.14

I am feeling a big gap of comprehension between Peter and I, on top of the lack of communication. We speak different languages. I would like collaboration as equals where we could exchange and discuss but it seems to be impossible. His email replies if any, are very short and only say that he will do this and that, like I ask him, which then sometimes doesn't happen. Peter seems to be rather passive in contrast to actively involved people who take initiatives, but then he is very devoted and hard working. I also had the feeling that he has a hard time seeing the whole picture of the project and liked to do and see small things. It worries me as he has to play the role of a coordinator between PU, CCI, Said, the filming crew, and us in Finland. And until now he hasn't shown any of the qualities of a coordinator.

14.5.14

Too frustrated about the lack of communication and sent Peter an email asking why is he not communicating better. What is the reason? Telling him that the way things are going at the moment is not ok and needs to change. I have had only short answers from him. No discussion. I have no clue how things are going at the site. Peter still doesn't have details which I am still drawing and there are no questions from him. I really wonder what they are doing if they have no plan. Who's ideas are they following. Are they simply deciding to do things the way they think is good. Most probably!

22.5.14

After a presentation of the work to some African visitors to Aalto University I get to

explain my difficulties with Peter to Susu Nousala. She explains that the only way is to avoid any emotions and give simple and clear instructions. I cannot expect any discussion.

23.5.14.

I finally call Peter again, after being completely cut out of the process. His is on his way home from the site. The toilet, he says, is finished. The women have almost not been at the site. It was him, Ima, CTN and the boys. I sort of expected an explanation of this sort. He promises to send me photos today or the next day.

Three days later I haven't received any photos or any replies to my numerous emails even after correcting the type of email and cutting out any emotions.

26.5.14

After expressly requesting a report from Peter on the construction process many times, nothing has been sent to me yet. I am so frustrated and the situation is untenable. I have prepared an email for explaining to the things that are not going according to proper project collaboration and am waiting to send it.

3.6.14. Never give up.

It feels a bit like the project has been sabotaged and that any proper communication is going to be impossible but I am not giving up.

Since I met with Susu I am following her advice to be as clear as possible and give clear instructions and send requests rather than expect any discussion between Peter and I. I also feel like I need to pre-digest all work steps and thoughts as he seems incapable of thinking through the right project frame. He has no holistic approach. Only orders and clear instructions will be of use, if

he reads his mails.

After four weeks of waiting for any communication or discussion and even after giving clear instructions on the next steps and the things needed here in Finland the local coordinator is not capable of answering.

I have received no feedback from the construction, no report, only have I received photos (and that after completion of the work, when I had requested photos for feedback on each step).

The monitoring and evaluation should happen now but I have no idea whether he reads his emails.

It is crucial to set clear meeting times and make sure the goals and objectives of the project are read and understood by all participants in the project.

The local coordinator still needs to be instructed on the goals and activities of the project. He is not aware of the full extent of the project.

I have just called him to arrange a skype call before the end of the week. I will instruct him on the documents to read and get acquainted with. The project goals and objectives as well as the things he needs to do as a coordinator.

His communication has been very poor or inexistent. Hopefully a direct voice call has a positive effect.

I still haven't received any feedback and reporting on the construction. Instead when I called Peter today he was on his way to Keko Machungwa to teach some people how to fill bottles for construction. I do not see how his role has turned into one of the Phast Ujenzi member's role. He is ignoring his task and taking on responsibilities he shouldn't. He is taking time for instructing people on things that are not useful right now but

ignoring tasks he has been asked to execute urgently.

4.6.2014 Clear Instructions.

I am really only starting to understand how to communicate with Peter. I am not satisfied with his ways but at least it seems he is reading the emails I am writing. He is like a very devoted good worker who doesn't think much about the whole context nor the whole project. He is apparently good at doing what he is told.

So at least I have one good lead on how to deal with him in the future.

The thing that still bothers me is that he is not replying to my emails and leaves me in complete darkness of the events happening in Keko Machungwa. But I guess if I trust that if I tell him something he will do it that is all I can expect from him. It is really difficult, as a continuous dialogue would be more fruitful in learning for all but it is doable. Nothing is perfect, especially not long distance work collaboration.

Ideally I should have stayed in Dar es Salaam for the whole time of the construction, which was not an option as I have other duties here in Finland. But it is something to be considered for people who intend to do similar works. I guess the solution for a smoother process would be to either find a partner that has the same communication habits than you do or to actually stay on site to judge of the process and participate yourself.

I have received a good photo of the toilet taken by a friend visiting Dar from Helsinki. The toilet looks very much more promising on this new photo than on the previous ones, even though a lot of mistakes are visible and might not be correctible.

If those errors are not correctible I have just now sent my comments on the things I

was able to see from the pictures, and have explained how things could have been done better and how we have to learn from that first toilet!

The whole process has been difficult for everyone as it is all unknown but if we at least all learn from it, then we have made a tremendous progress for the future toilet constructions.

PILOT MONITORING AND INAUGURATION. 17.7-1.8.2014

18.7.2014

(The daladala to posta from Salvation army is on Kilwa road)

Visit at Pilot site with Hezron. CTN, Ima and some boys are present. Provisory schedule with Hezron.

CTN is fixing some small things in the toilet. Making plans with Hezron about the following week. He is really great to work with, very efficient. He organises the French filter building with Ima. CTN has designed and made a door out of wood and bottles. It looks quite nice and stable. I am thinking of the use of that new technique to make the walls of the superstructure for the future toilets. CTN is covering the inside of the toilet with polycarbonate sheets to increase privacy.

1.8.2014. Inauguration event a Pilot site + Meeting at WAHECO (Water, Health, Community Development and Education Teams) office.

Event: about 250 people present! see news flash: <https://www.youtube.com/watch?v=xjaTL5zi2k>

@ WAHECO office. Listing officials and People present at inauguration event:

~ vice mayor of Temeke (the guy who of-

fered me Keko citizenship)

~ ward executive office (he had been there in April already)

~ ward health officer

~ ward community development officer

~ Municipal economist (represented municipal director)

~ Municipal health officer

~ WAHECO (4 people)

~ Municipal social welfare officer (she had been there in April already)

~ Subward executive officer (Shyo)

~ Subward health officer

~ Subward community development officer

~ Federation from all over DSM: Vingunguti, Mabwepande, Chamazi, Keko Machungwa, Kigamboni, Karakata, Tandale, Mbagala

~ Media: TV1, ITV, Channel 10, clouds FM/ TV, magic FM, Newsletter Mtanzania, Citizen (newspaper), the Guardian.

After the meeting made plans with Hezron for the following weeks and decided on the next skype meeting to be held on the Monday 4th of August.





COORDINATING AND SUPERVISING FROM A DISTANCE.

9.10.2014

The construction of the following toilets has started on the 7th of October. Only two toilets will be under construction simultaneously (to avoid longer waiting time for the curing of the concrete slabs). There were some issues in the financial area that delayed the works drastically. PU intended to work on 10 toilets at the same time, benefiting from the help of other community members for the buildings. The two toilets will be built following the plans of the Pilot toilet except for some changes: the material for the walls this time will be interlocking bricks, a material the community is buying from the Chamazi community who fabricates the bricks themselves. In the future PU is thinking of purchasing their own brick press to be able to make the bricks themselves. The bricks are made of:

_____. The choice of the clients and positioning of the toilets was left entirely for PU to decide with the clients. Some challenges arose in terms of space and one of the toilets is adjacent to a wall, when on the plans all walls have a function. The plan needed to be revised and has been by PU and the clients together, agreeing on a new plan. PU didn't ask to consult me for advice. If their choices made with the client turn out to be positive it will be a success. If the choices made turn out to be creating more problems we will need to discuss about the issue and find a better solution for the next toilets. I wonder if they fully understand my role.

24.10.14

I have just looked at pictures of the two October toilets. It seems that there is a real need for consequent construction education and that the sole instructions given during

the Pilot were not enough for the community to understand, firstly the steps to follow for the laying of the bottles and secondly the importance of quality work, maybe thirdly also the importance of communication with CCI and I during those days as they are still in a learning process, they should seek for advice when not certain of their actions. It seems there needs to be someone the whole group trusts and listens to that should be in charge of checking the quality of the work like a site conductor, as I am not able to be on site during construction and check the work regularly to make sure they keep learning and applying proper building manners. If I was able to be there I would go myself. The solution would be, one of those three options are viable. There simply needs to be someone or even two persons respected and trusted who take care of the quality and good advancement of the work. In a later stage maybe PU has learned and understood enough so they can check the quality on their own but as long as the learning process goes, proper ways need to be employed, maybe that person can act like a sort of coach, that would assist Hezron and would have knowledge in construction, communication, and facilitating skills as well as community working.

2. "A PILOT TOILET" DRAWINGS AND PHOTOS

- ~ 1:50 plans
- ~ 1:50 sections
- ~ 1:50 elevations
- ~ axonometries
- ~ photos

A PILOT TOILET



Location: Keko Machungwa, Temeke Municipality, Dar es Salaam, Tanzania.
User: *Keko Machungwa youth center.*

Bathroom capacity: 35-45 people

Specifications:

- 2 UDDTs (with double composting vaults)
- pet bottle-wall technique base
- 1 shower
- urine storage
- grey water treatment
- handwashing

April 14th 2014

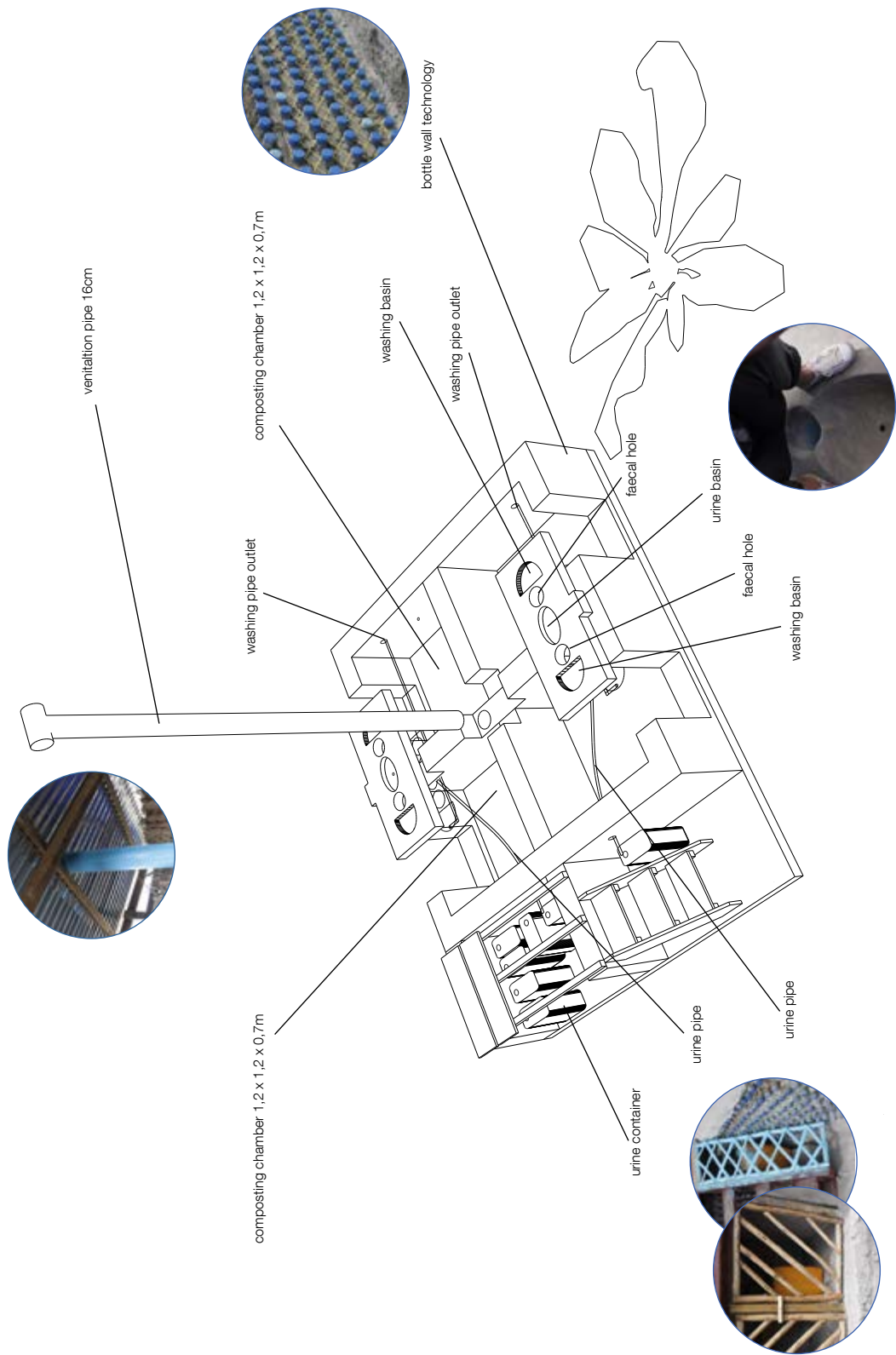


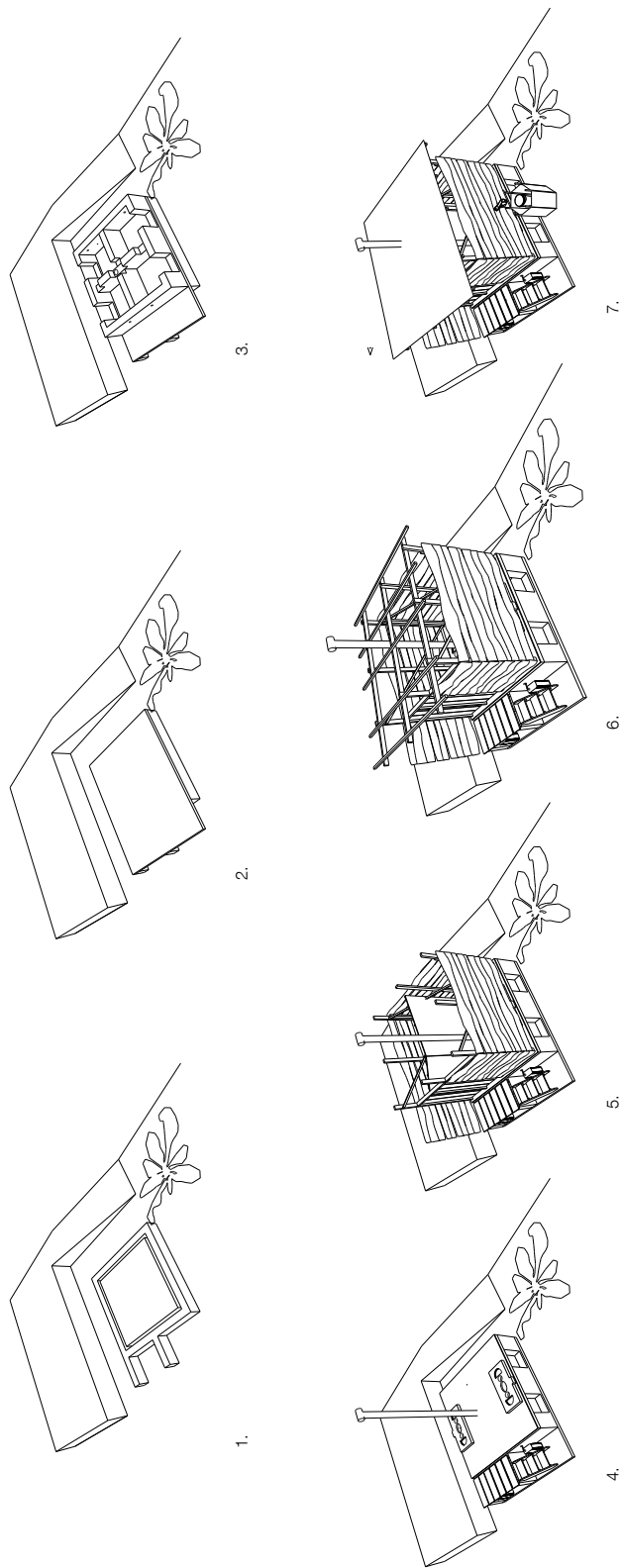
May 1st 2014



July 2014

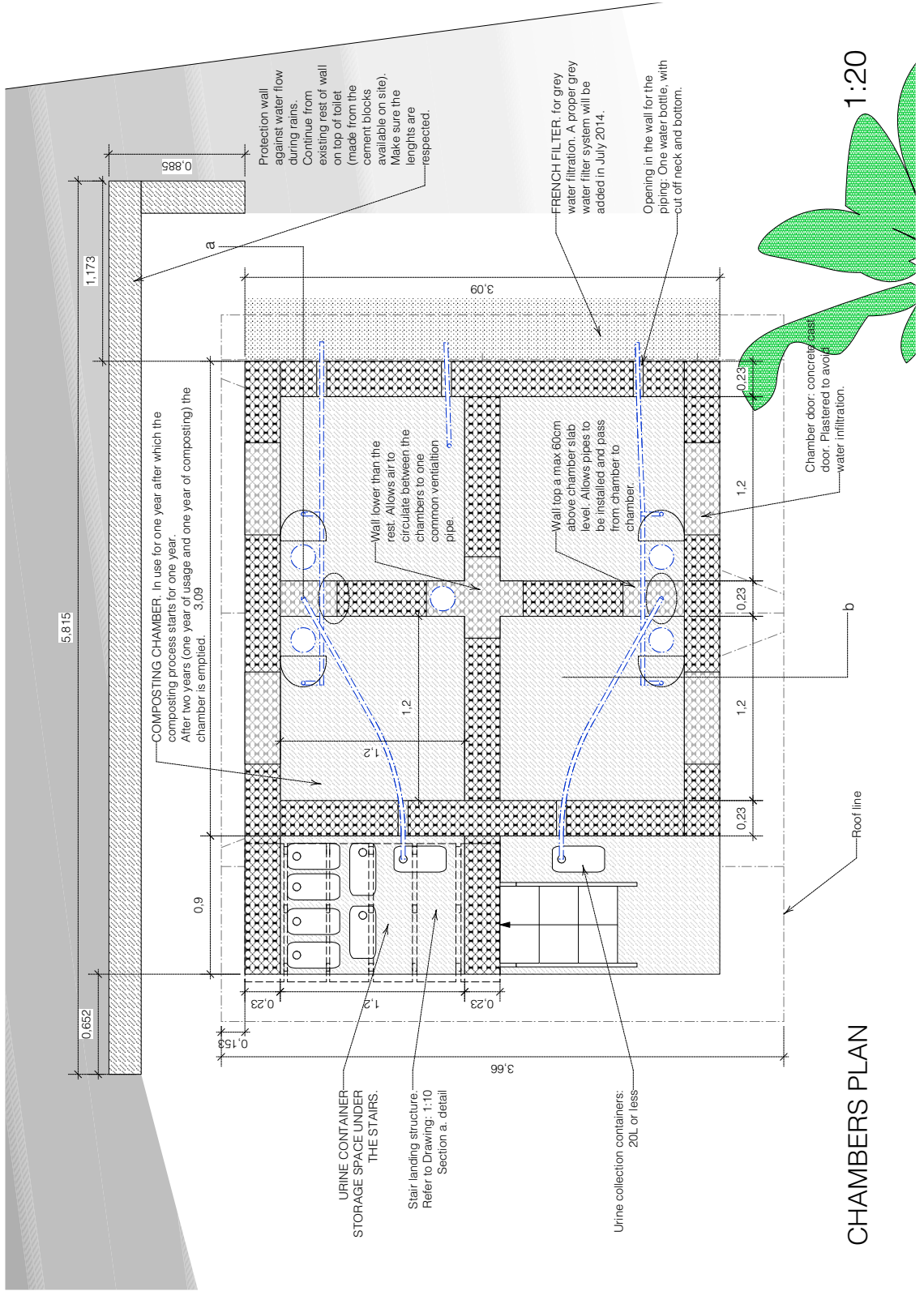


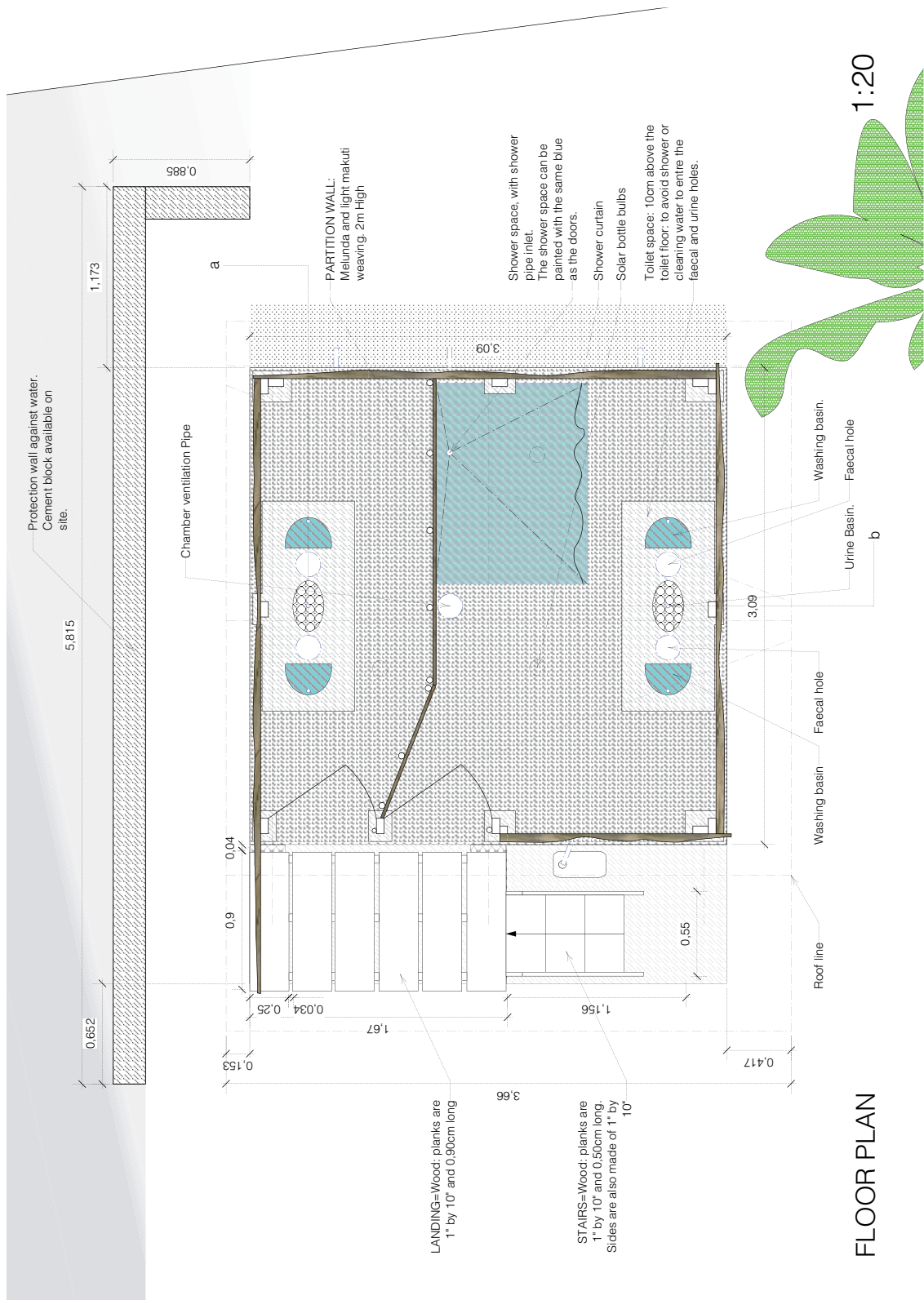




Building Progress:

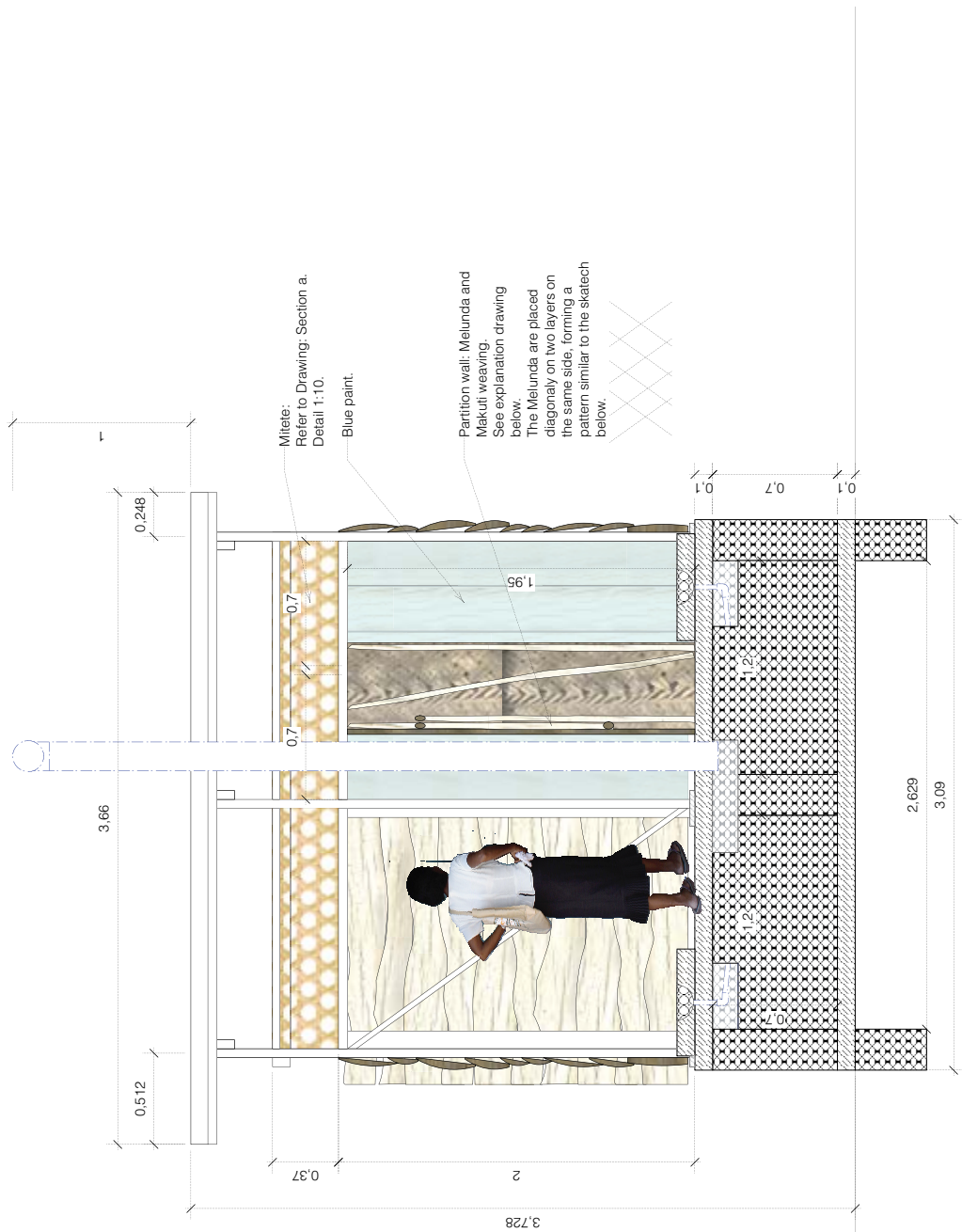
1. digging of foundation pit 40cm deep, laying of cement blocks for foundations, watering and preparing for concrete slab pouring / 2. pouring of concrete slab / 3. laying rows of 0.5l water bottles with 2.5cm cement mortar in between each layer, bottles are placed on top of each other and nylon rope is tied every 4th layer to the necks of the bottles to reinforce the structure / 4. pouring of toilet slab and moulding of toilet spaces after slab has cured, mounting of side walls for stairs and landing, pouring of floor layer and placing of all pipes / 5. placing walls on base after walls of Mabanzhi have previously been mounted into independent panels, adding separation wall / 6. attach doors, and mount roof structure / 7. roof sheets, grey water treatment, handwashing, containers for urine, and finishing

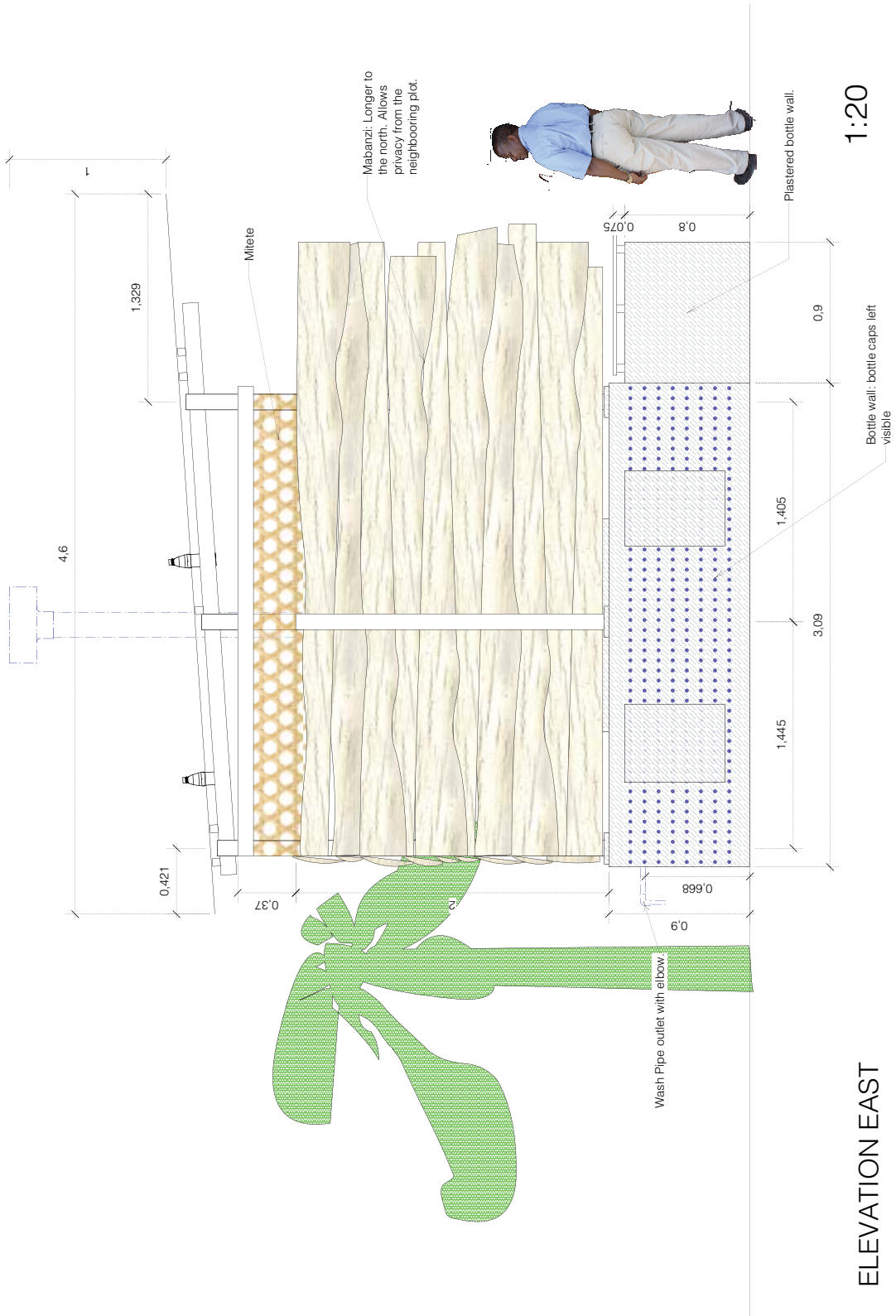




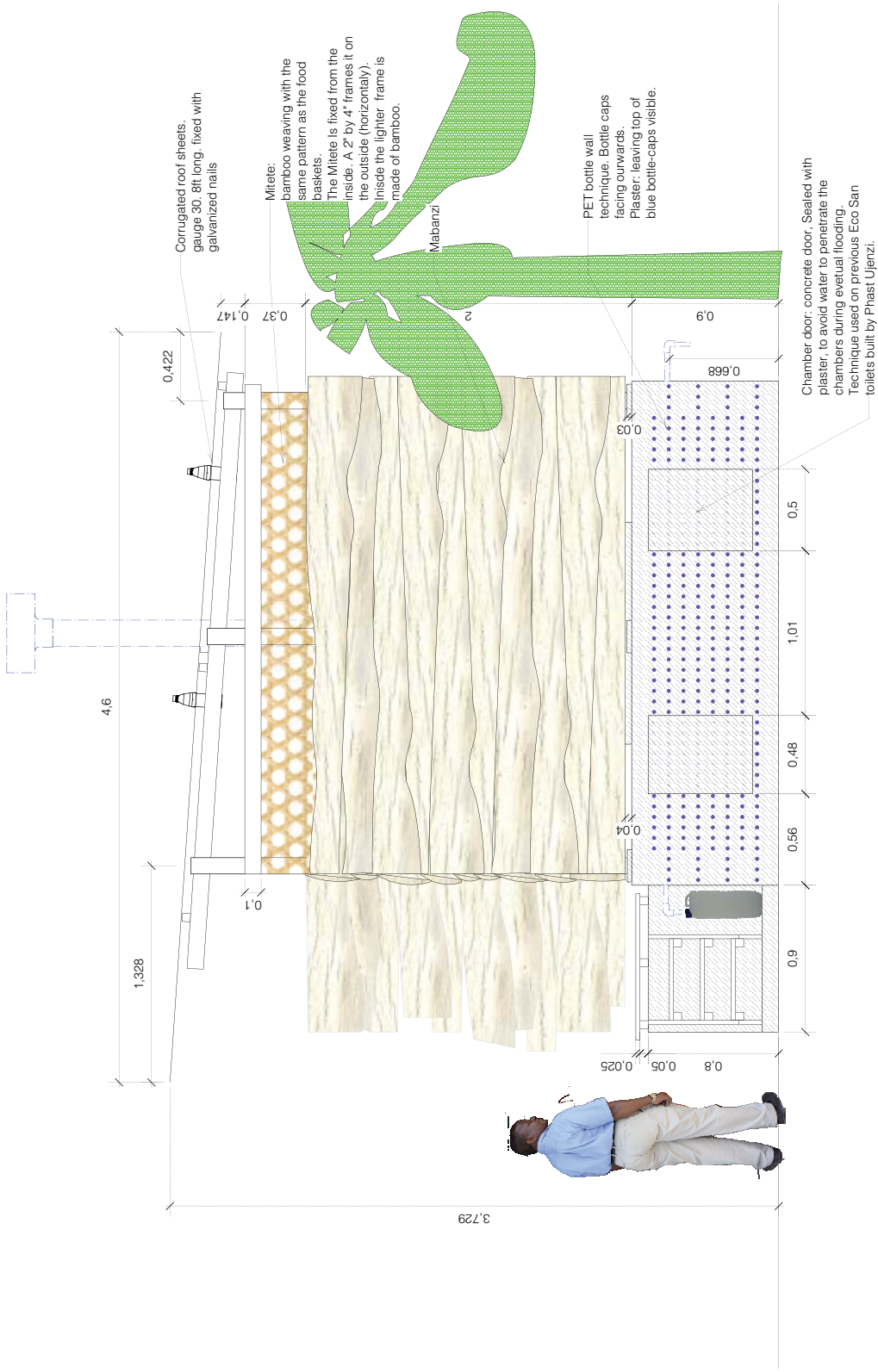
FLOOR PLAN





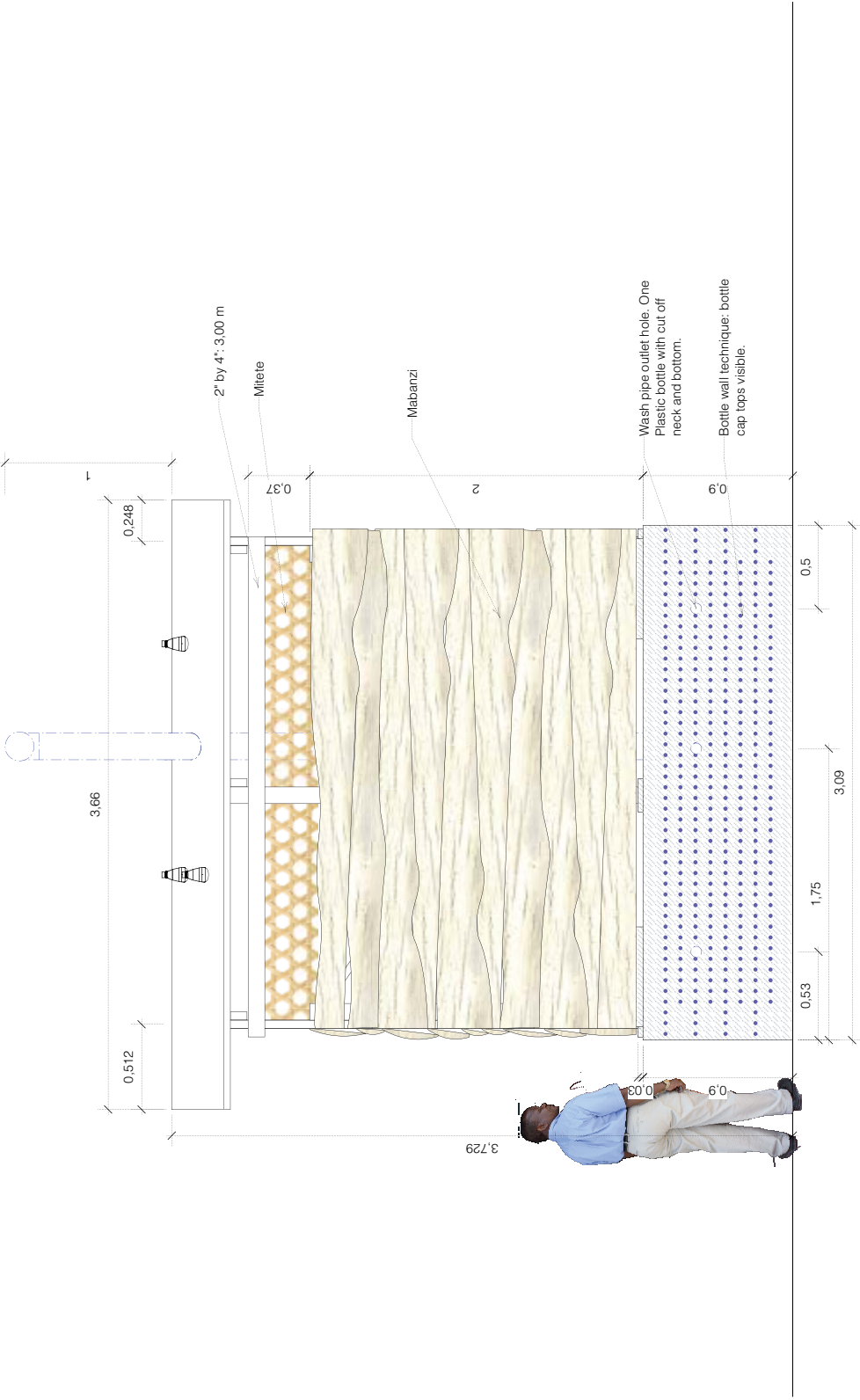


ELEVATION EAST



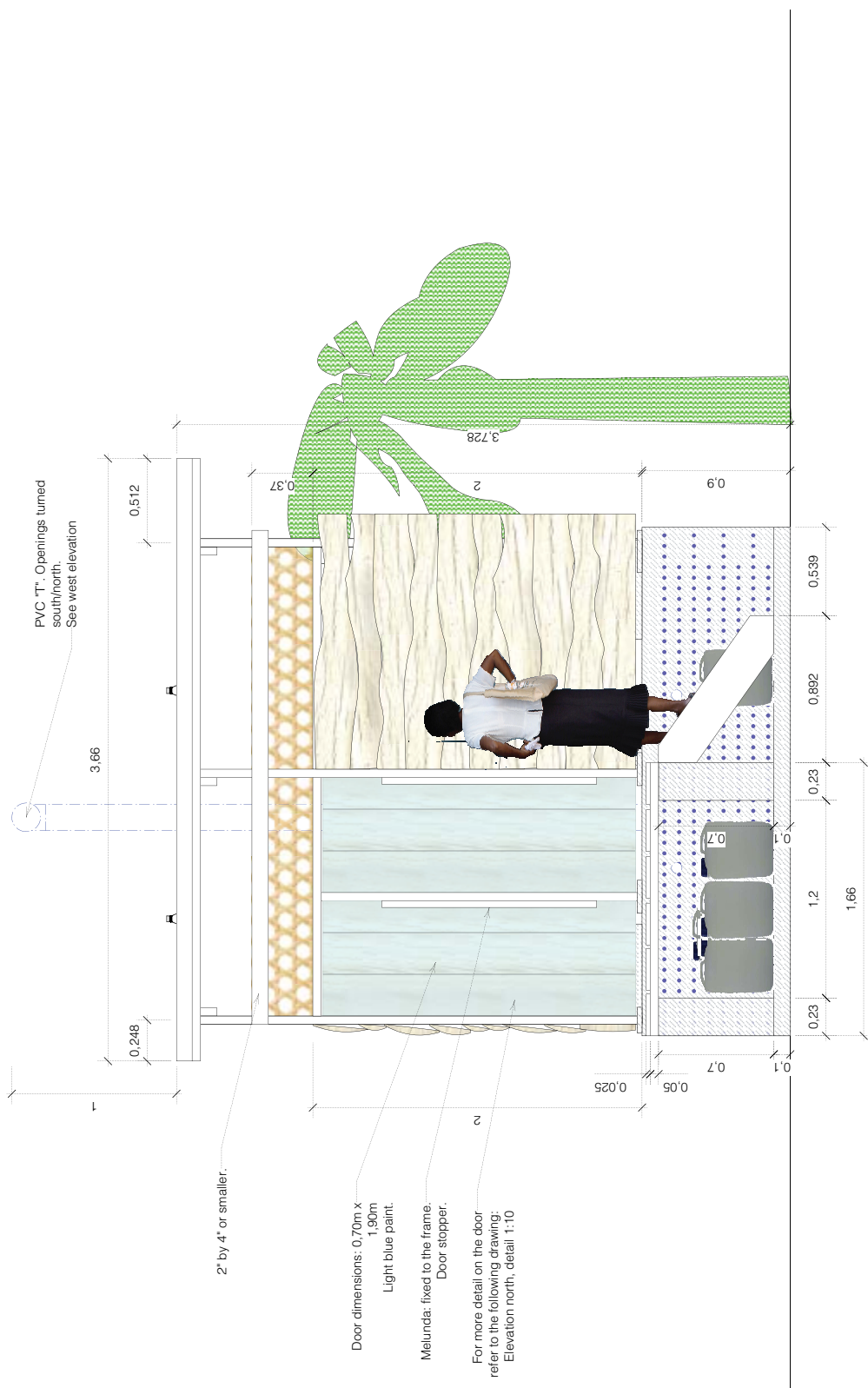
WEST ELEVATION

1:20



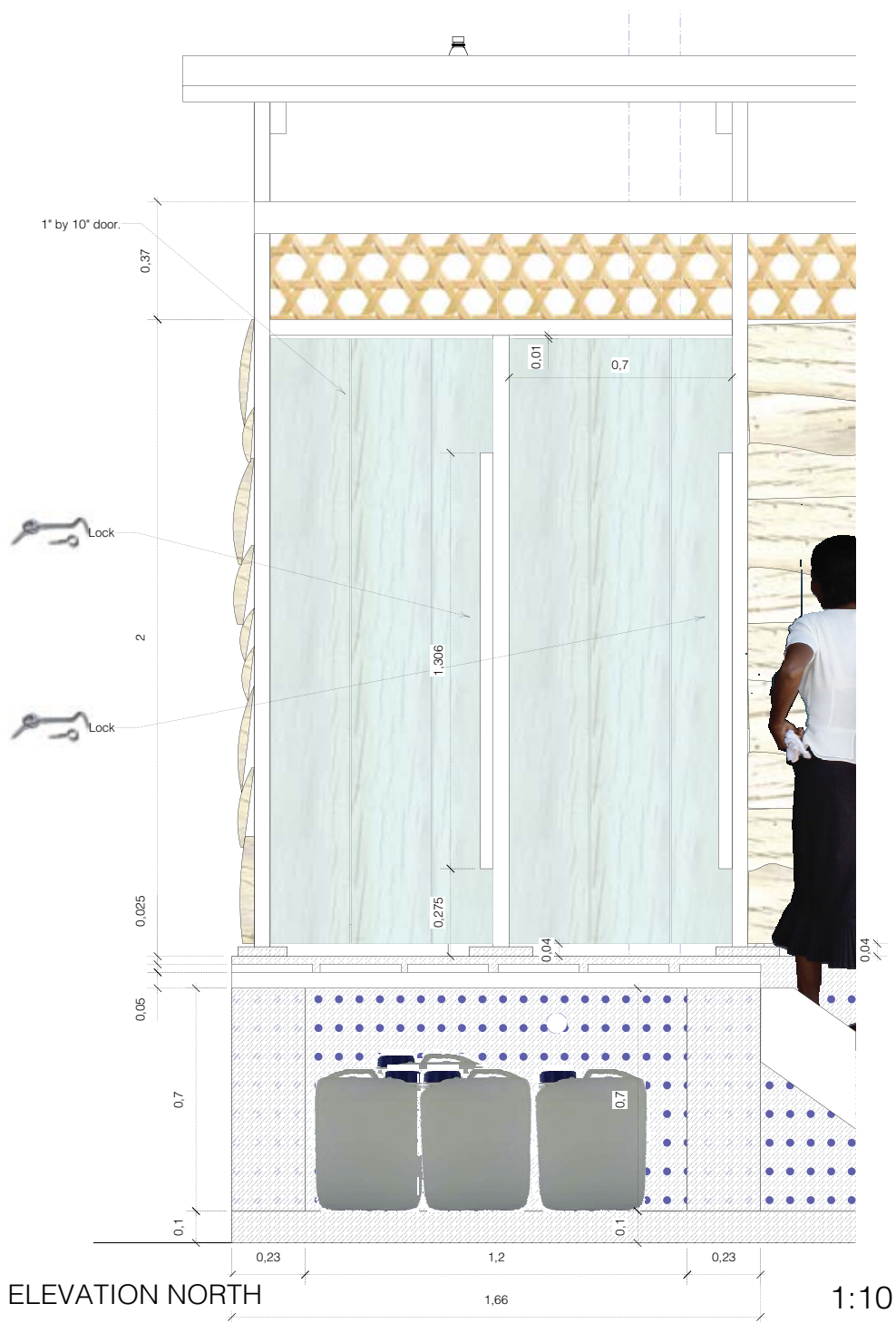
1:20

ELEVATION SOUTH



1:20

ELEVATION NORTH



LANDING:
There might be a step
between the landing and the
toilet floor. It is better if the
toilet floor is higher than the
landing.

1" by 10"

2" by 2"

0.05 0.02

0.02

0.85

0.36

0.36

0.05

0.03

0.04

0.1

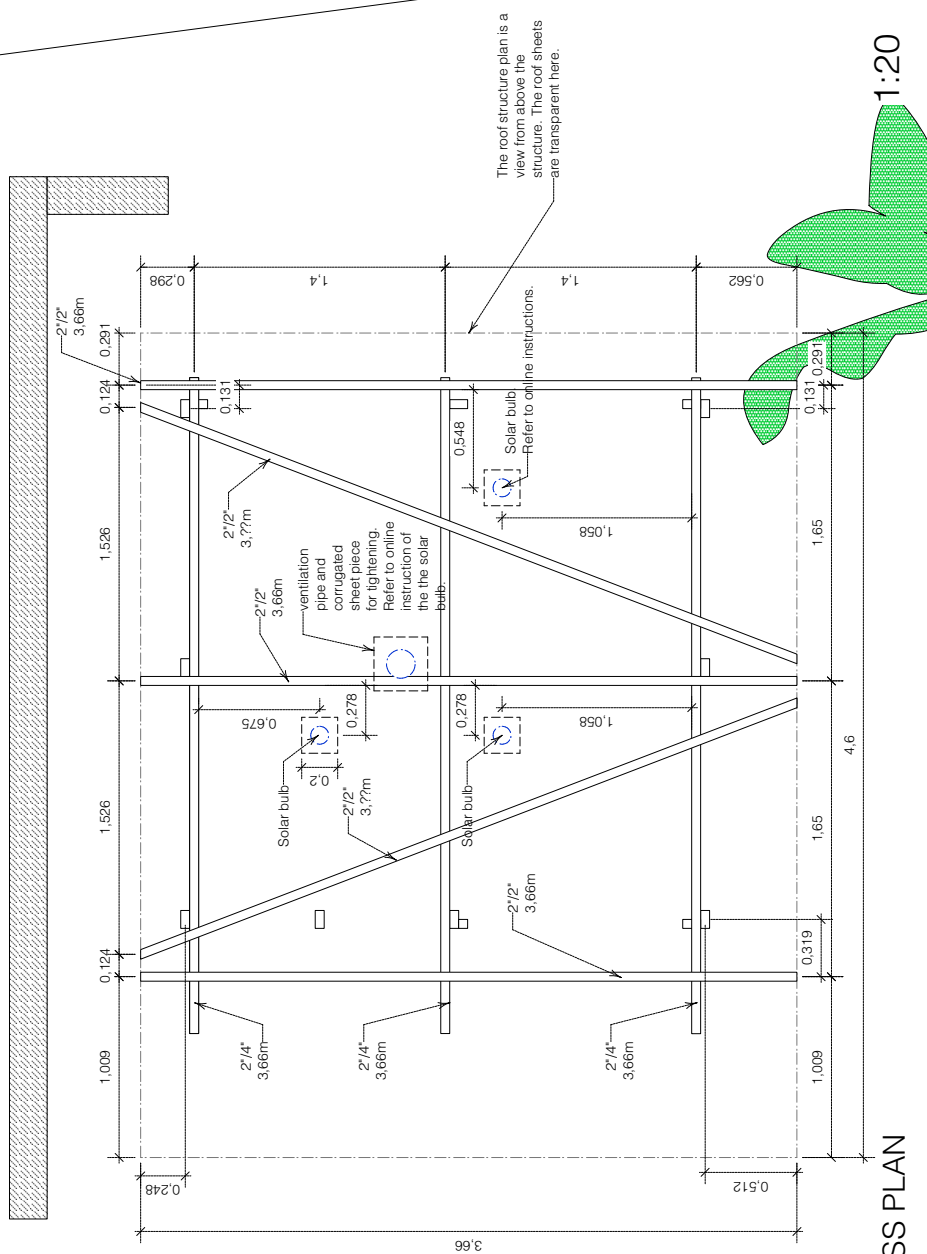
0.9

Mitete: fixed on the inside
and framed inside and out.
Frame: outside and inside.
Outside framed by the
Mabanzi on the lower part
and by a 2" by 4" on the top.
Framed on the inside, on top
and under. Either by bamboo
or smaller wood planks: max
4cm wide.

Mabanzi: laid in clapboard
from the outside.
Nailed to the 2" by 4" with 3"
or 4" nails.

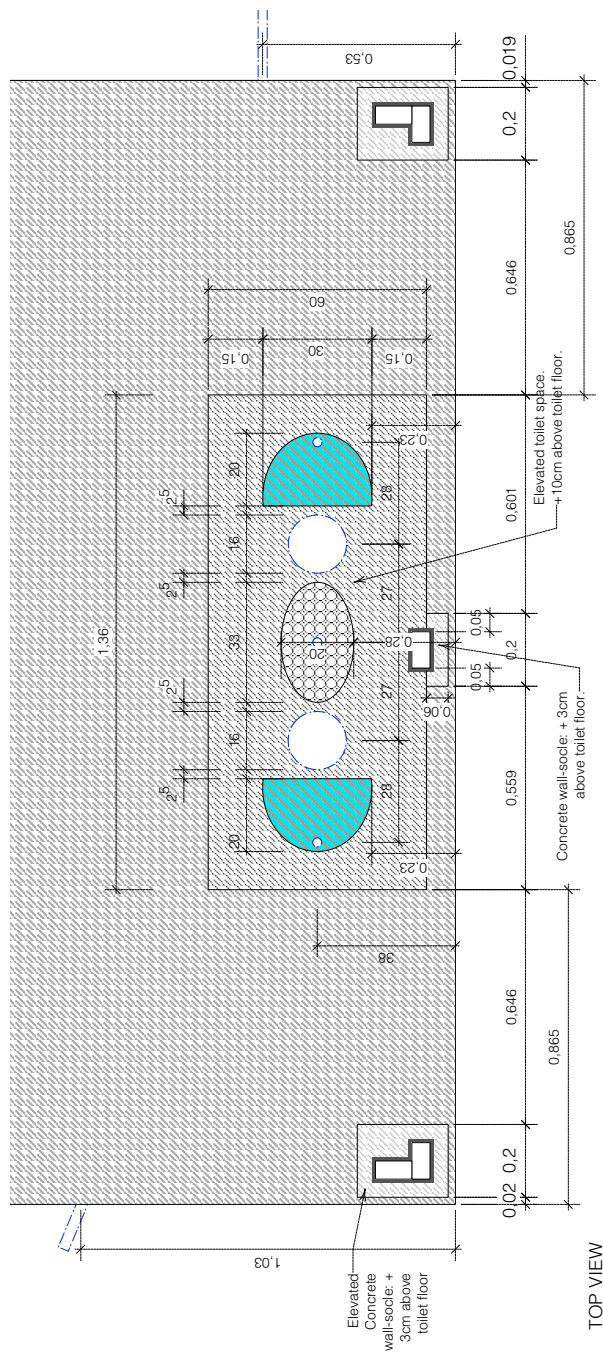
SECTION a. DETAIL

1:10

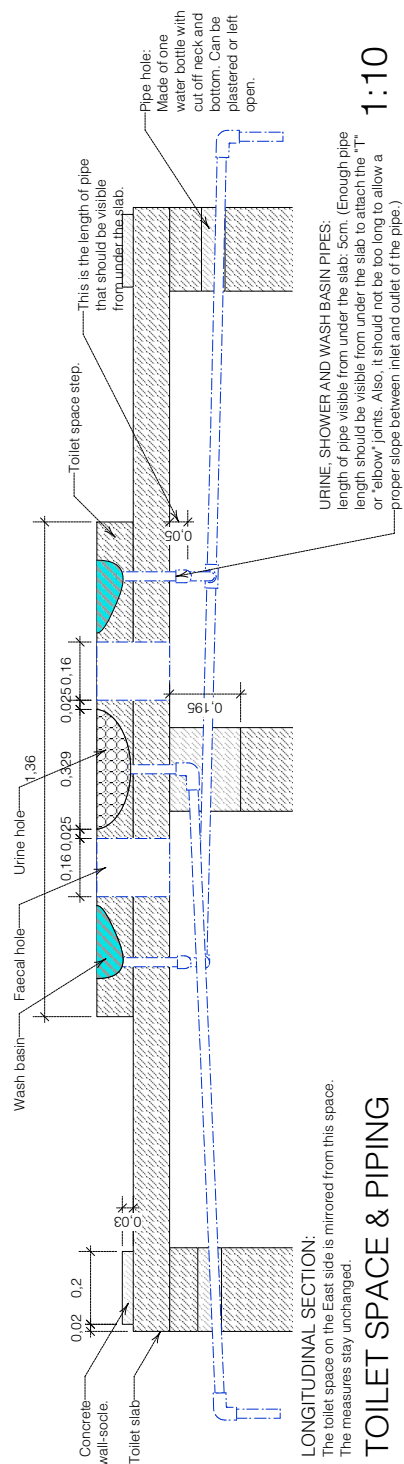


1:20

ROOF TRUSS PLAN



TOP VIEW



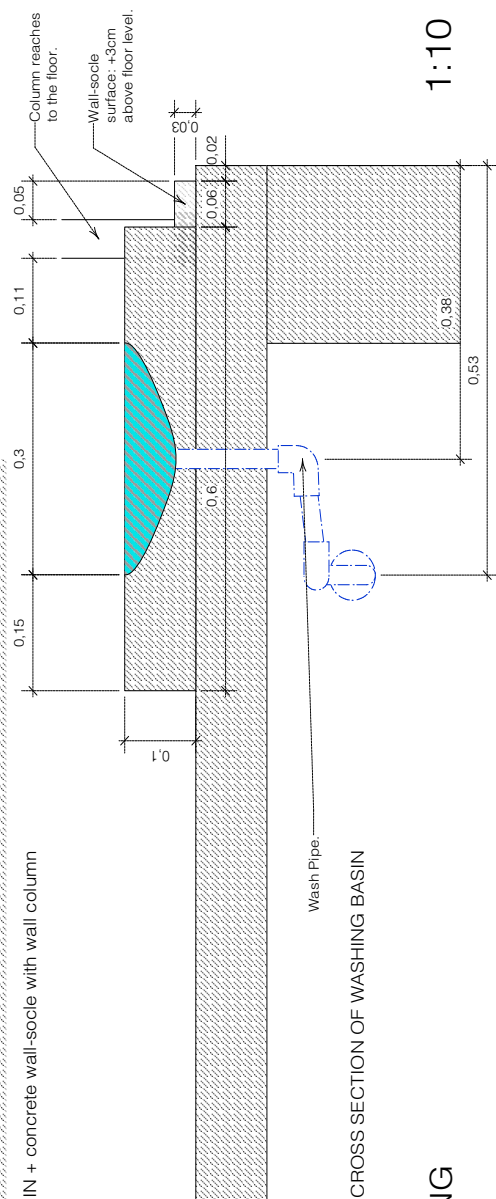
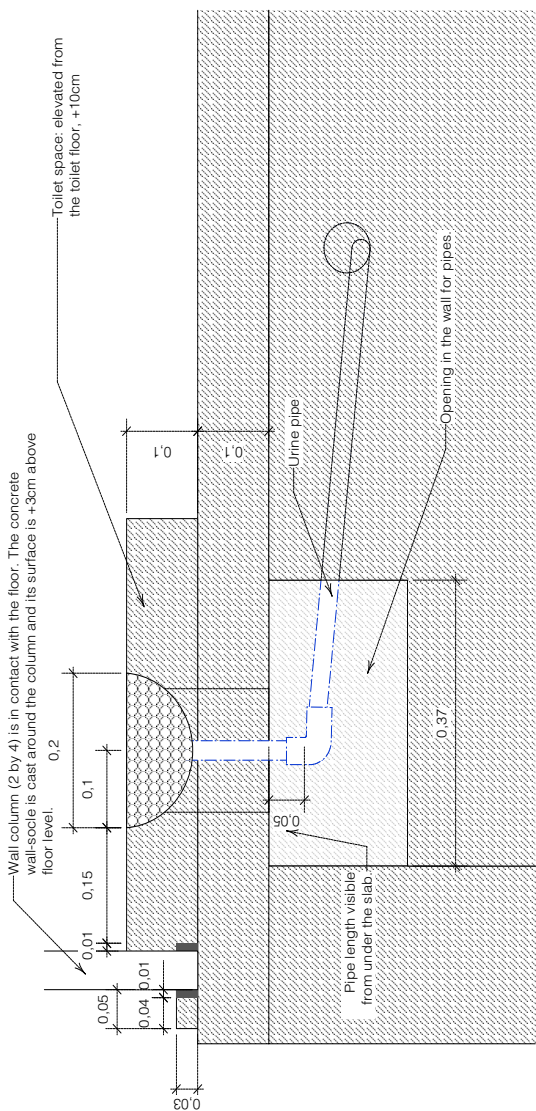
LONGITUDINAL SECTION:

The toilet space on the East side is mirrored from this space. The measures stay unchanged.

TOILET SPACE & PIPING

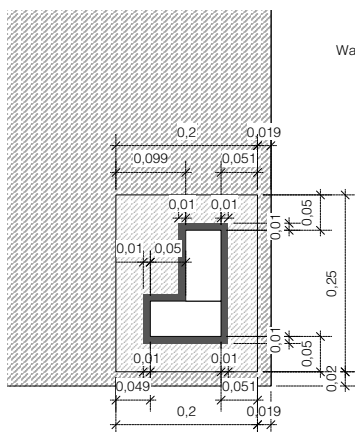
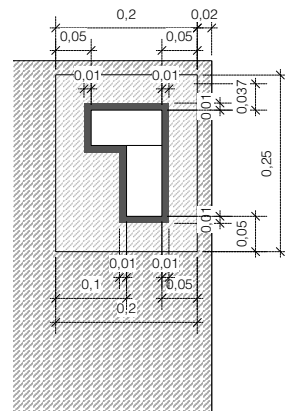
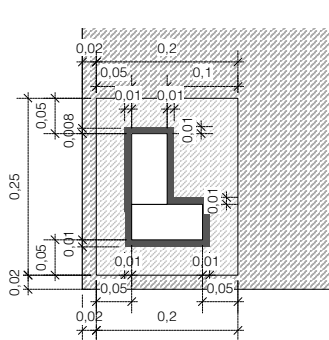
URINE, SHOWER AND WASH BASIN PIPES:
length of pipe visible from under the slab: 5cm. (Enough pipe length should be visible from under the slab to attach the "T" or "elbow" joints. Also, it should not be too long to allow a proper slope between inlet and outlet of the pipe.)

1:10

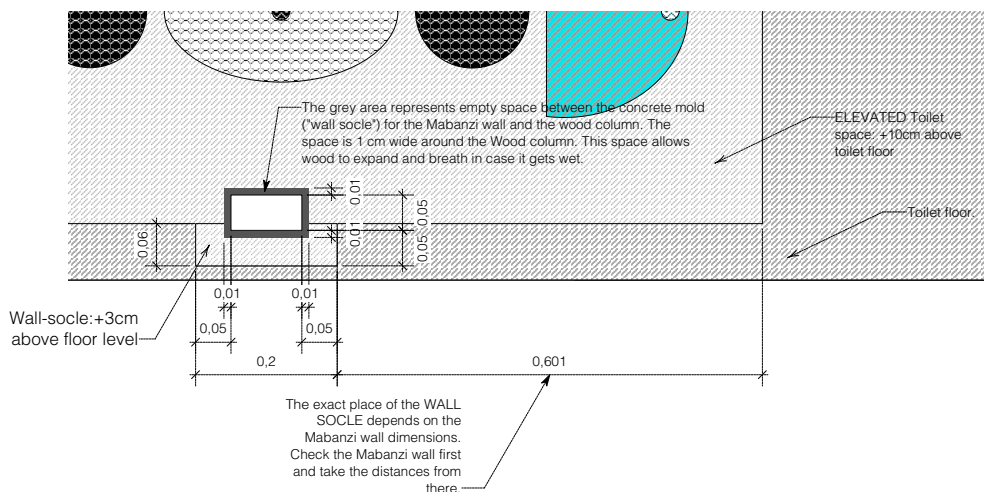
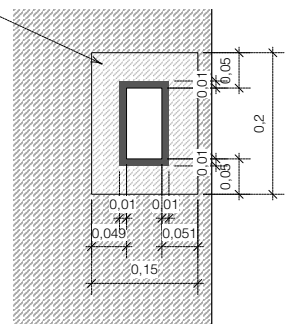


TOILET SPACE PIPING

1:10

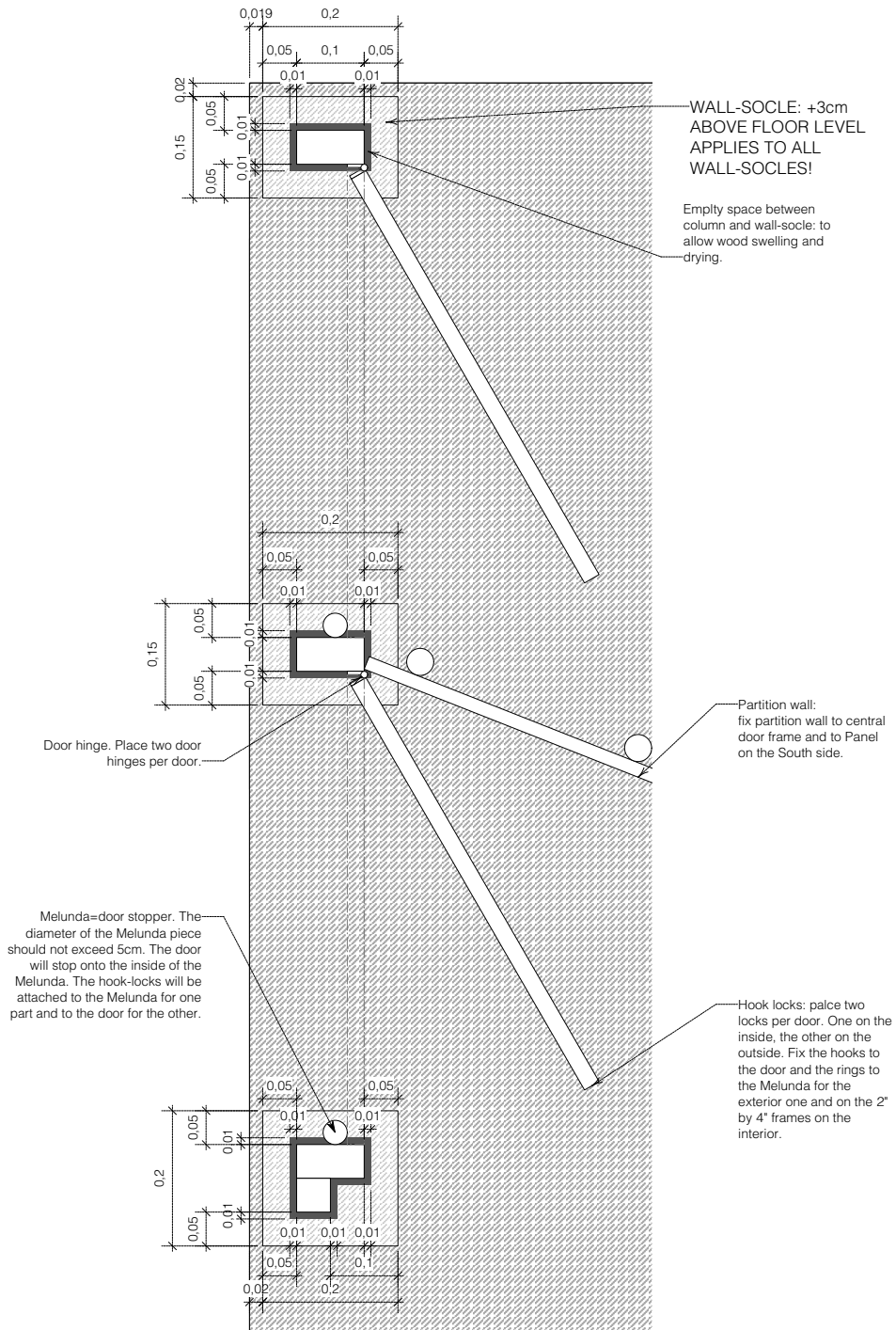


Wall socle surface: +3cm
above floor level.
APLIES TO ALL
WALL-SOCLES!



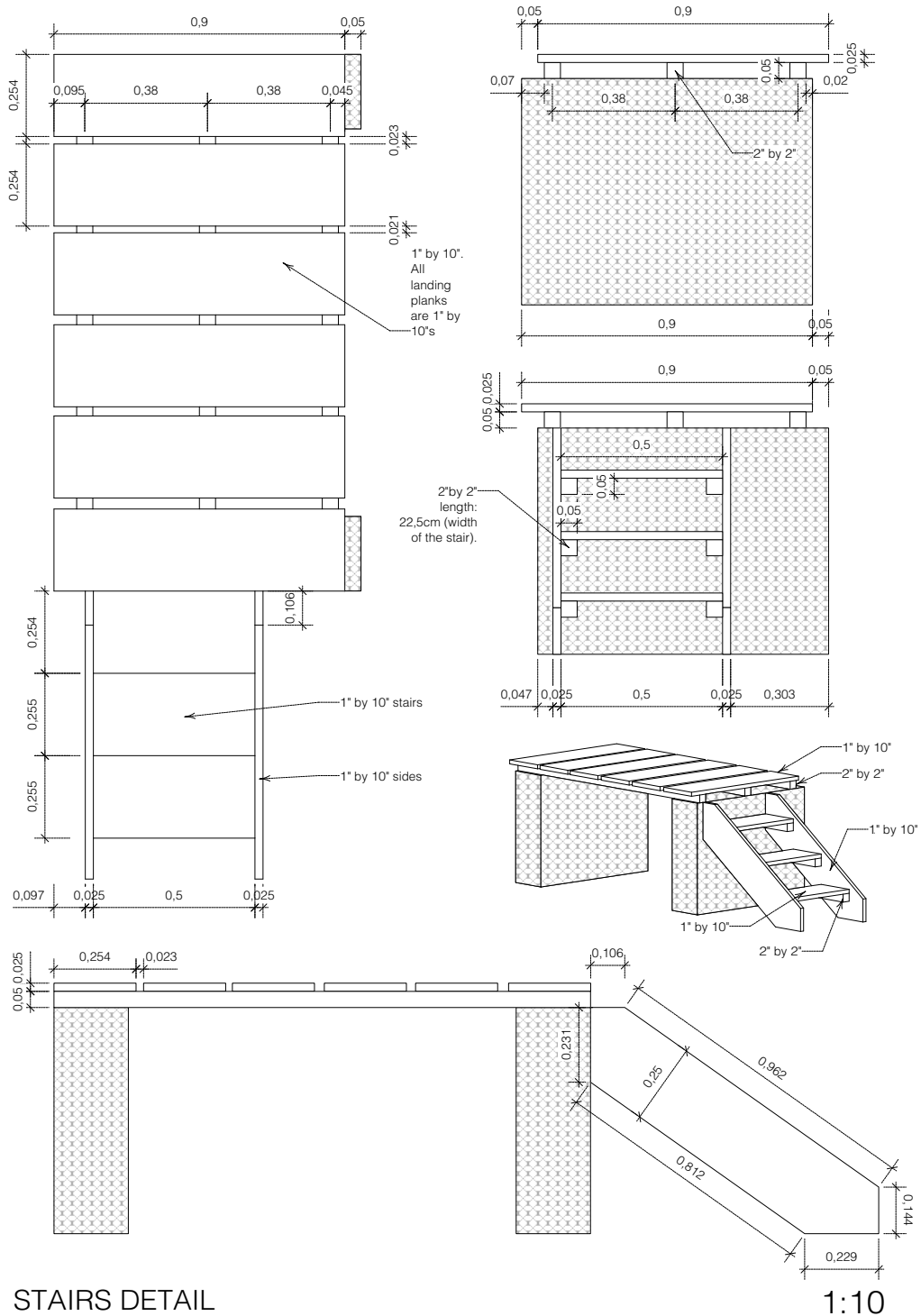
CONCRETE WALL-SOCLES, HORIZONTAL SECTIONS.

1:5



DOOR WALL-SOCLES, HORIZONTAL SECTION

1:5



3. VIDEO OF THE PILOT TOILET:

<https://www.youtube.com/watch?v=KhmvdD8ZFGM>



4. A DIALOGUE WITH ARCHITECTS. ORIGINAL INTERVIEWS.

~ Peter Fatteringer and the Design-build Studio

~ Saija Hollmen and Ukumbi

Interview with Peter Fatteringer

PAST WORKS AND EXPERIENCE:

ZF Where are you from?

PF I am from Linz.

ZF Where did you study?

PF Here at the TU Wien.

ZF Why architecture?

PF Basically a general interest “was zu gestalten” (in English: to make, design, create form shape arrange, develop organise, craft, frame, construct, model, mould something). But also during my studies, because of the urge to implement rather quickly, so that it doesn't get stuck in the design phase but also continue to the realisation. It was an important requirement for me.

ZF What kind of student where you?

PF I liked studying. When I left university after my diploma, I was looking back (literally) at the building and thought it was really a great time. One and a half years later I was coming back in, through the same door I left the building from. Back then I was working at Atelier van Lieshout and we were invited to do a guest professorship at the TU Wien. I really enjoyed studying and also I did a lot of travelling while studying, and working in different offices.

ZF Did you use your study time to get to know different cities?

PF It was more in my leisure time, in

the summer holidays. I didn't do too much of this Erasmus stuff, but I did my thesis research in N-Y city. That was the only travelling that was connected to my studies. I think that is what is more and more missing nowadays; students are focusing on finishing their studies as soon as possible. It's more and more getting school like here; very efficient, going fast through the studies. I think it is very important to take your time while studying, to work while studying, not only in architecture offices but to do anything [...]. It's very important to get all kinds of different inputs, even working behind a bar. Because then everything relates to everything, if you just go to school and study, it's not grounded somehow.

ZF Through your studies and work experience, is there anything in particular that made you do what you are doing now or is it more of a step by step experience?

PF There was no single occasion; it's more of a combination of many different influences.

ZF Do you have an example?

PF One that was very important. Together with my father we refurbished our house, I did a lot of work on that. I was quite a small kid, but one part of the summer I was helping and the rest I was travelling.

ZF So in a sense it was your first Design.Build Studio.

THE ADDON 20 HÖHENMETER PROJECT:

1200 VIENNA, A , 2005

DURATION: 17.06.2005 - 31.07.2005

TEMPORARY INSTALLATION IN PUBLIC SPACE

IN COLLABORATION WITH: MICHAEL RIEPER AND STUDENTS OF THE VIENNA UNIVERSITY OF TECHNOLOGY

COMMISSIONED BY: KÖR - KUNST IM ÖFFENTLICHEN RAUM WIEN.

RANGE OF WORK: INITIATIVE / IDEA / CONCEPT / DESIGN / IMPLEMENTATION / BUILDING CONSTRUCTION / DEVELOPMENT AND DIRECTION OF A 45-DAY CULTURAL PROGRAMME / MANAGEMENT OF THE OPERATIONAL DUTIES, THE IN-HOUSE CANTEEN AND GUEST ACCOMMODATIONS / ART AND CULTURAL MEDIATION

ZF The first time I have seen your work was at the architecture Biennale 2008 in Venice (Architecture beyond buildings), on a post card (it was the ADDON 20 Höhenmeter), I didn't know then that it was you but I was really inspired [...]. Then the second time was when talking about my toilet project in Tanzania with a friend - who is at the TU -, he asked me:

- "Do you know Peter Fattinger at the TU?"

- "No"

Then went on to check your website and found out I did know at least one of your projects! I was very inspired by your sanitary installations, especially the shower over the river in Rotterdam and the shower in the sink (see Part I extract). I then became more familiar with the Design.Build Studio through Dietmar Steiner's text in the Arch+ "Think global build social" with some of the works in Nias and the Young Caritas project on the Gürtel in Vienna. Most of your works are inspiring and evoke very important and interesting things [...] about: "What can I do with architecture that can be useful and have a positive impact." Or "Who do I build for and what do we build for [...]". Closing the gap between the people you build for or with and the people who are building. How to work as one entity - which doesn't necessarily mean that the people you build for/with have to come up with the idea - people with their knowledge of their environment and architects with the knowledge of their discipline.

PF I think that is very important, be-

cause participation doesn't really mean that users/citizens exactly tell how it has to look like but rather how it has to work. They have to give the information: "what do I want", the functions [...] But we are the architects and they are still involved in the building process and giving a basic idea of what it should be about.

ZF In your work we very strongly can see this attempt at trying to close the gap between the people and the architect and also other actors around (builders or authorities) for example with the add on which was, as you said, proposed by the city of Wien.

PF The city of Wien made a call for proposals for art projects in the public space. So we answered, and they liked it and even said "can you make it bigger?" [laughing], "of course". We were curating the whole program around the addon, with concerts, screenings around the construction, also inviting artists to stay there for a kind of residency and they (artists) again did projects concerning the surrounding (2005).

ZF You had a similar previous project in Graz.

PF Two years before (2003). It was not so much like a free standing sculpture but its basic idea was quite similar; to enlarge the public space to get it vertical, only this one was connected to a building. What was interesting about this project is that it was interacting with this building, so you could also walk into the building from the second floor and then go out through the roof again on our construction. It was also inhabited by the students who built it for three weeks.

ZF So the students built the construction in Graz.

PF And the one in Wien, only the artist in residence unit, which was as a kind of Design.Build studio and this was linked

with a bridge to the tower (addon) and the tower was designed by us but we had again former students who participated then in the construction and took over certain parts.

DESIGN BUILD STUDIO

(for more info: <http://www.fattinger-orso.com/info/teaching.html>)

ZF How many people do you usually have in the studio?

PF Basically it's about twenty, sometimes it's bigger but it's working best in this kind of group of 20, where everybody is involved. What is very important about this Design.Build Studios is that it's a team work, not like a competition where single teams are working against each other. The teams are developing different variations, but then we discuss all the suggestions and decide as whole big team which approach to develop further and what ideas to leave behind. Then they split up in teams of two to three people each, work on different suggestions, we then again as big team find out which way to develop then they have to stick to the idea until we meet next week again then still do different versions. It is very important that everybody is really involved, works together and discusses together. It's also interesting that some people are more silent in the design process but they are very good in the discussing project so they are not really very much drawing but they are putting their part in the discussion.

ZF It's very interesting because you use different layers of people's abilities.

PF Exactly, usually when you do studio on your own there isn't really a discussion with the other students but much more with the teacher so of course these discussions take a lot of time.

ZF Is this Studio taking place during

one semester?

PF More or less. For the projects in South Africa and Indonesia we had one semester of designing but a shorter period of building. In South Africa it was five weeks of building. Everybody went there.

ZF Do you have sponsors?

PF They [students] pay their own flights. We have sponsors but we take this money for buying the building materials so they definitely have to pay for travelling on their own. Because otherwise it's really like burning money and it's also difficult to say that it's an effective use of the money. It's that big amount of travelling costs [making gestures] for students building something somewhere and much smaller for the building material. In Indonesia we were able to stay there for free because it was part of a monastery and they [the hosts] also cooked for us, but at least we paid for the flights.

ZF Was it a school or an orphanage in Indonesia?

PF An orphanage. It was a multipurpose room for the orphanage where kids can play.

ZF What is the general comment on your studio, how does it compare to more traditional studios. What is the general reaction [of students]?

PF They like it a lot, they get into it! That's also why they spend so much time on these projects, because they like it and they are really keen on, not only designing but building and then finally seeing how it is used. They really go from the first sketch to the opening of the project, they really get the whole picture. All the students who start the studio really bring it to an end, in other studios, normal studios, there is a drop off rate of at least 10 to 15% but here they really

stick to it. Of course it's very time consuming but...

ZF Yes but somehow I feel that as soon as it gets real it involves some part of your brain that doesn't get involved if you just need to draw and hang your posters.

PF It's also a lot about taking over responsibilities. Here they know that every line they draw has a meaning. Also they learn about this friction that you have when you transform your design to the built thing, that it's not so easy, not because you have drawn it like this will it be like this, because there are a lot of obstacles in between which you have to react to, also constraints of budget, time schedule, there are many things to consider also if you are building outside.

PF A big issue in the design build is the "try and error". You have to be careful that there are no fatal errors of course! You are responsible because the people you are building for are expecting the building; there are sponsors involved that give money so we can not completely fail. You have to make sure that it can be realized fully and not left over half finished. Still there is a lot of space to play around, try things, work in an experimental way and not do it the way professional companies do: the easiest or cheapest ways.

It's also a good thing that you have more time to build because so many students already in the design process are developing things and looking for different variations, doing many many different models to get to the answer. Yet the big chance is that you can really do architecture for people who usually would not hire an architect for their project. It's a big problem that the social projects are not supposed to use architects because it's "only a social project". It's a sad thing that architecture is only supposed to

be present when it is something fancy, that the rich clientele is the one that hires you [...]. So they say: "No it's enough that they have some kind of shelter, that they have some room", but nobody cares how it looks like. But in reality it's the other way around, especially for those people who are living in very poor and small conditions, they really need; a community place to eat which is really good and which they can use and which makes most effect for the money that is put into it. Really to think hard to make it perfect and not think, "ok we just do some cheap way because they just need some room and it does not matter if it is nice or not, because they are happy to have a room."

ZF Do you think that it makes a big difference in the way people think and are involved in the project, that the Design.Build Studio involves students rather than professionals or the community members?

PF I think it is very important to involve local people, sometimes they might get a little bit of money. So it's different, sometimes it's the parents of the kids of the kindergarten who are involved and do not really get money but if it is some neighbours of the neighbour who is a skilled worker and he wants to participate we have some small budget to allow that. This is very difficult, because it is a question of how much you give, how many people you can really involve, you have to have an idea of the normal wage in the area, you have to be careful not to overpay them because that kind of breaks the whole system then.

ZF So for example in Orange farm...

PF In the first project it was a day-care centre for handicapped. It was very interesting because the handicapped people were on site the whole day, some were just sitting there watching us and enjoying that there

was something happening and others who were more mobile and physically not that handicapped really tried to get involved, to clean something to hold something or paint something. These people didn't get money because they were in this organisation anyway, then there were some skilled workers who laid bricks, because they knew how to do it more accurately. So the students were helping them and learning from them, there was also an electrician from the township who installed the electricity hand in hand with the students, he was the professional and the students learned from him. And then it was the other way around the handicapped helped the students out.

ZF Everybody had something to do.

PF For example in our project in Indonesia it was very important to get in contact with the local people because it's also part of the learning process for the students not only to design and build but also to get insight into the life of the people, get closer to them. In comparison to that the project in Vienna (addon), people from that district were also involved but not so much in the building process, much more as users. During the building phase when they came [neighbours] and asked what it's about what are we doing here, some people during construction didn't get the point "we don't need that stuff!" but then when it opened they climbed up and tried to meet us and said: "Oh now we understand!". It was also about getting these different generations together but also generally people with different backgrounds and offering something special for all of them.

ZF So to go back to the Design.Build Studio, what are the main reasons why you started it?

PF The main reason is that I was already very interested when I was studying.

When I got the guest professorship I thought : "Ok that's the chance to do something, not just to design and talk about it but really to build it and get it used". So the first project was a very small pavilion this "Glühwein Stand" you maybe know, for selling hot wine (2000). The idea was to build it but make it different so to offer DJ music there, offer performances. This was the first hot wine booth that had these additional functions. Nowadays you have those in the Museums Quartier, you have them anywhere. So there not only did the students have to design and build it but they also had to run it for 4 weeks in the winter time, selling hot wine doing the program, booking DJ's...

ZF You weren't at university yet?

PF I was invited to do this, but then they asked, "Will you come again"?

ZF Were you in any way inspired by the Rural studio?

PF The project in South Africa was. A green politician from Vienna had some contacts in south Africa and he was also friends with Steiner (Dietmar Steiner, director of the Architektur Zentrum Wien AZW), so we came in contact and he asked why couldn't we try to do a project like you do in Vienna or Graz, like the facade project (in Graz), in South Africa. This was inspired by the rural studio to build in local, poor communities so it started only then after the Rural studio exhibition in the AZW (2003).

ZF Why a name in English? Is there a German name for it?

PF It doesn't sound nice in German. All Studios are design studios "Entwerfen", so it was nice to have design and build and not only design there.

ZF When did you actually start the design build studio?

TMP HOMEBASE PROJECT:

PF Within the guest professorship with Van Lieshaut, we hosted a normal design studio with this mobile kiosk bar and then the following semester it started. With this mobile bar we collected money for an institution which was taking care of asylum seekers, who entered Austria but had to stay at the airport because they were not really allowed in so they were held back in this no-man's-land, they were not really in Austria but they were in this transfer zone and had to stay there for several months sometimes living in very poor conditions. FM4 the radio station was doing this Christmas charity for the asylum seekers so they sent over some DJ's to the mobile bar and we collected money for the Christmas project. We decided that in the next term, to do a project to improve their living conditions. So we did nice places for the asylum seekers to sleep and spend their whole day there, those months of waiting where they didn't know what would happen. We made new furniture for this area where they were held back. They were held back in containers and it was very rough. The authorities were aware of the situation, at the same time radio FM4 Charity was putting some pressure on them. Everybody became aware that the conditions they were living in were terrible. They knew they had to do something. So we got invited by FM4 who connected us. The authorities then gave us some money for the building materials. It became a very interesting situation for the students who had to deal with this institution and the many questions it was raising. There was a lot of thinking around this project: "What are we actually doing? Are we really helping the situation? Is it really a sustainable improvement for the asylum seekers?"

ZF What do you think now?

PF I think it was definitely good that we

did it.

ZF Did you get any feedback from the asylum seekers?

PF We got some from Caritas, the NGO who is taking care of them. They said it was working well, We had worked out some areas where Caritas and the asylum seekers could get together to fill out the asylum paper work...

ZF Did you involve the asylum seekers in the design process?

PF No. Caritas knew what needed to happen, so we visited the place, saw the situation and tried to make the best out of it. There is a coming and going between the asylum seekers, they stay maximum three months.

ZF There are not many studios of this kind in architecture schools.

PF There is a movement that is already visible I believe. The project we did in South-Africa for example... and there are many universities in Germany, Munich, Aachen, Dessau, also in Slovenia that are doing this kind of projects.

FATTINGER/ORSO STUDIO

ZF I have some questions about your own studio

PF Yes together with my wife Veronika Orso.

ZF Is there a strong link between what you are doing in the Design Build studio and what you are doing in your own Studio?

PF Yes a very strong link because we are also a sort of design/build studio. Depending on the size of the projects we do build ourselves. So for example a really big project like Bellevue. The yellow house, we had the basic construction done by the com-

pany but we did all the furniture, finishing and things like that. Also we were in charge of the whole cultural program during the three months, all the workshops, concerts, guest artists. We were doing the post cards, the program, graphic design, the book in the end of the project...

ZF And it was your initiative or did somebody commission you?

PF It was our initiative at first and finally we were commissioned by the European cultural capital (Linz 2009). We first approached them and said we would like to do some project, they said "ok, we know your work a little bit, we also would like to have you do a project, so we have small budget so you can develop some ideas". We developed some ideas, presented them and finally focused on this new landscape park by the highway. It was about these two districts which were divided by the highway for many years, now they were growing back together through the project: Landscapepark BinderMichl-Spallerhof, that bridged the highway over 1km, they made a nice park and we did the intervention there to get all the people there from the two neighbourhoods put together to be a sort of cultural centre.

ZF It seems to be a very strong idea behind your projects, bringing students together, bringing local people together, or bringing authorities with you and asylum seekers together. It's something I could see clearly in your projects. So I was curious about what you think about the scale of your projects. How much does the scale you are working with - which is more of a human scale rather than crazy big and uncontrollable - help in achieving these ideas of bringing people together and making them participate?

PF It's a lot about the scale and also

about how you can enter the building, already from the design to bring people in, to make them interested and curious. You know. If it is Niederschwellig (in English: low-threshold), so that there is nothing between the building and the people, so that it is easily accessible, so that people are not afraid to go in a that it is somehow inviting.

ZF Does it work? For example with the add-on, people were at first sceptical "we don't need this" and then walked up and said "oh it's actually cool".

PF Still they want to get up because they want to look down.

ZF Do you try to do that always, to try to bring people to discover by themselves?

PF The buildings, the architecture should always allow people to discover something from the inside that you could not find out without going through the building. Also by involving the students in the project, so they are there, it's not just a sculpture that you just leave and people use and make whatever they want but there is quite a strong presence of us and also of the students who try to communicate about the project and try to tell what it is about. You can't just leave it on its own. There always has to be someone there, who is cooking, it's also very important with these projects.

ZF Whichever project?

PF Add on, Bellevue project... it gets people together, to eat and drink to talk to stay.

ZF Danke.

Interview with Saija Hollmen

Zita Where are you from?

Saija I was born in Turku. When I was a kid I moved to Oulu, I went to school there. For architecture I came to Helsinki.

Z How did you come to study architecture?

S I was interested in many things and had made a list of things I envisioned to study, there were 12. Architecture was not part of those maybe because it had been too close to me - when growing up my dad was drawing buildings in the basement. But in 1991 I started my studies in Otaniemi, and the reason I chose architecture I think is that I discovered that architecture has this ability of inviting other disciplines, that it's a very broad-based way of seeing things.

Z What kind of student were you?

S I was a meticulous student, very passionate, talented... yes, but not always hitting the right note, some major flops too, and I didn't always want to do things in the right order. Sometimes it might have been better to listen to my teachers more, I was very hard headed. But I was always eager to learn.

Z Is there a course you remember in particular?

S The very first ones with Juhani Pallasmaa were very influential - I was taking music a lot not so much visual arts - and when coming to the architecture school, Juhani Pallasmaa, had just started as a Professor in the basics of Architecture, he said that he has as his goal to "mislead a generation of architects". This was of course not his goal, it was said "off the record". I think he meant to open perspectives to various fields of life to the students, and not offer just one way of seeing architecture. His lectures

in the very beginning were a mind blowing experience, it was a firework of arts, and different ways of seeing the world altogether and for me it was very influential, it allowed me to build a broader world from the world I knew, he was the main character at the time. The other course that was very influential was the course we took in Senegal with Hennu Kjisik and Veikko Vasko, "Interplay of cultures" (that became World architecture, City in Crisis and then later City in transition)

Z Basically in the last two years of your diploma.

S I was on my fifth year at that time. It was very influential because it resulted in me, Jenni (Reuter) and Helena (Sandman) working together with the red house (Women's centre in Rufisque) and that is the path that we are still following.

Z How did the Women's centre (which was your first project of this kind) come to be?

S It started in 1996, as part of the course, "Interplay of cultures", presented by Veikko Vasko and Hennu Kjisik to Juhani Pallasmaa - who was the dean of the department of Architecture (Aalto University) at the time and was very interested in doing such things. Also involved was the Senegalese-Finnish Association ARC and Anne Rosenlew, a Finnish sociologist. Arts and Architecture students from Nordic countries were invited to work with local communities. Our assignment was to work with local women's groups that Anne had created connections with. During the course we sensed, felt - it was an instinct -, that it might actually turn out to be something! We then started to apply for funding. It was a long way. We travelled there on and off. But once the city donated the site, the target group of women with whom we would be working with was

defined; we finally started to do the final design. Then we got some funding from the Finnish Ministry of Foreign affairs, private donors, and also a lot of material donations from locals.

Z Have you been there again?

S Unfortunately not, but we have received photos and reports from visitors. It's very lively; they even have built an additional room. After 13 years it is still being used by the same women; it didn't end up being used by something else than it was designed for.

Z How did the construction happen?

S We went there on and off and sending a tender, we hired a local contractor with a local company. So he had professional workers working with him but he also hired the sons and husbands of the women. It was very good as it became a very strong local project. We also wanted to show the best possible way of building on clay soils, so we changed a lot of the ground and made proper foundations so people would see how it should be done correctly.

Z What happened after this project?

S In 2001 the building was finished and very well received by the community, who had taken complete ownership of the project, but at the same time we were also very tired and thought, "never again", as it had been a very long five years. But quite soon it became evident that the project had taken a life of its own. There was a huge interest internationally on the project. We started getting proposals and possible other projects, but there was always the problem of funding. By 2007, we founded UKUMBI (Helena Sandman and Jenni Reuter), because by then it had become evident, that in order to do projects like that you would need a non profit organisation in order to

be credible enough and apply for funding from governmental organisations. Funding is always a problem if you don't have an instrumentality to apply for funds. It took a while to understand what we had created through the women's centre, what it meant, and that we ought to do something with it.

Z You now have some experience in practicing architecture, especially in developing countries. Could you describe the path that you have embraced and tell how it is different from a more traditional way of practicing architecture?

S We usually start from the question: "What would be the architectural intervention that would help these people?" Then in collaboration with the local people we create the project. We try to be very sensible we try to figure out the needs the community has and would there be a way for architecture to facilitate some of those needs and solve some problems. I think Architecture has a great ability to invite other disciplines. Sometimes problems are such that no physical structures can solve issues, but sometimes surprisingly, providing quality environments solves many problems they would not even identify as problems because architecture to me is a way of either opening or closing possibilities. It is the kind of sensibility that I would like my students to gain, that, the design choices we make really have profound consequences and meaning in the environment and in the possibilities we create or hinder.

Z What, would you say, is the central question when you design and work in the global south?

S How does the culture affect the concept of space? How do these people use space and what is their notion of using space? It's connected to culture, climate,

gender issues, all of this is connected to different aspects you need to be aware of. There is no such thing as universal architecture, one should be aware of cultural differences when you start your design.

Z If there is a link between all your works with UKUMBI what would it be?

S If there is a similarity in the vocabulary of architecture we use, it's because of our education, our aesthetics choices but the core, the hierarchy of spaces, the way to organise the plot, and the spirit of the architecture is meant to follow the local culture and the way people live and use space and their concept of good environment.

Z What is UKUMBI?

S It is a non-profit organisation registered in Finland. UKUMBI is a network of people who like to think that architecture matters. And that it has a potential to create a better environment for people who are not able to pay for the services, nor might be living in underprivileged conditions or need support.

Z What does UKUMBI mean?

S It's Swahili and it means a forum or meeting place.

Z How did UKUMBI come to life?

S After we had received quite many project proposals, and again we realised that we have no way of getting any funding for any sort of projects unless we do something, unless we organise ourselves around something other than a private company. It was something that came out of necessity. If we want to do something like that, like the women's centre - we all had recovered from the tiring process of the women's centre experience [laughing].

Z You felt like you had enough energy

to continue?

S Based on the all things we had learned and the way the women's centre was received, we saw there was a lot of values there that we had maybe not been aware of while we were doing it but were able to see it at that point and we did want to continue doing some things like that. We recognised that we had certain ideas and we wanted to make them visible and we set up an organisation to work on those issues. It was a philosophical and practical decision. We all agreed that an NGO would be the way to do it, because it is so clearly about not being an enterprise, it's about the idea of architecture being something other than making profit, that is worth purely non-profit.

Z How would you describe your work as an architect and what is it you are aiming to achieve? Personally.

S We are all teaching, it's a good combination because through education you get reminded of what is important, what are the core issues you are dealing with. The NGO work on top creates a great combination. Understanding the possibilities architecture has. Better understand the possibilities and variations our profession might have in the rapidly changing society.

Z Exploring the biodiversity of architecture...

S Exploring the different variations and possibilities we haven't explored yet, recognised, encountered, made us of. Pushing the boundaries.

Z When looking at the works on the Ukumbi webpage I could identify that most of the projects presented are dealing with children, women or education. Is there any particular reason for this?

S [Citing African Proverb by: Ghana-

ian scholar Dr. James Emmanuel Kwegyir-Aggrey] "When you educate a man you educate a person, when you educate a woman you educate a community [family, nation]". If you empower women they are the ones who take care of the children in any conditions. If you get girls to school, if they learn how to take care of themselves first and their families. They don't get married too early if they are able to stand for themselves, if they have skills to support themselves they are not being sold as wives as easily. They become visible, person who have capacities and capabilities if they go to school. And their communities become more equal and their brothers learn to appreciate their sisters, thus their wives, their daughters. Educating girls is the key to equal societies and the well being of this planet.

Z If you were to enunciate a critique of a certain architectural practice today, what would it be?

S The extreme search for formalistic wow, that only plays with exclusive, expensive materials just for the sake of being different and more visible. I am not convinced that this creates a good environment for everyone. There are extremes that in some contexts are inappropriate. I do not particularly want to oppose to any way of practicing architecture. It's just that you need to be aware of the context where you are. And in big cities, skyscrapers and expensive buildings might have their place but in other locations they would not be appropriate. You just have to be sensitive to where you are and what you are doing. I've chosen to work with small scale-large scale issues that touch the lives of people on a grass root level. It's never going to be a big scale but it might have a big scale impact.

Z So would the critique be lack of sensibility to context?

S Maybe. I want to broaden the perspective and push the boundaries of the architecture profession. All these aspects have a place and belong to it but I think that whatever we do, we ought to be sensible to the culture, climate and sustainability issues in whatever we do. I think that is more and more being the trend in the overall concept of building, which is good, because we are forced to wake up and my way of working is finding other ways and other connections for architecture to work with other disciplines.

Z How important for your projects is it to set a common vision with the beneficiaries?

S It's the core. The whole project is always outlined according to the actual needs the community has. We become careful with choosing the partners we work with, because it's important to find NGOs or communities that are organised enough, who are very rooted in the community and working on the grass root level. If you can't commit yourself for 7 years to work with a community you have to collaborate with people who can. You have to collaborate with people who are rooted in the environment, it might necessarily have to be architects, it might be a local NGO, local people who are rooted and become your link to the societies and the communities and their needs and aspirations and sort of facilitate your work of facilitating the community's. It's a true collaboration, a discussion and communication. The principles we have with UKUMBI and the needs and aspirations of the community need to meet in order to make a meaningful project.

Z In the works at UKUMBI which projects are projects you desired and realised and which are projects that you were so to say commissioned to do?

S UKUMBI does not have many

projects yet, as you know, the first one that is actually an UKUMBI project that was funded by the ministry of foreign affairs of Finland is the Shelter house project in Moshi which is now being constructed. That was a true collaboration with KWIECO and UKUMBI, that started as a collaboration project. The one before that was a project we started with architecture for humanity in Moshi, an orphanage project, that was maybe closer to a commission.

Z Did it ever happen that your desires were the starting point of a project, where you found a place a community...

S I would say the Senegalese women's centre started like that. But then again the shelter house sort of started like that because we actively mapped and looked for women organisations in those areas, therefore it was an initiative that we took, that we looked for a suitable organisation to work with. When we found some through discussions we developed a project together. KWIECO had had the idea and need for a shelter for a long time, and we decided to facilitate that by collaborating with them. It can never be something that we impose. In that sense it was an active search that we did, whereas in Cairo we were linked to an organisation by the Finnish embassy.

Z The Cairo project, is it finished (A learning centre for Zabbaleen, the trash collecting community)?

S The design is finished. It has not yet been built because of the revolution.

Z I am impatient to see it!

S It's the key to a better future for any community. In so many countries, in the countries we have worked in, it is a reality that the women and girls do not have the same possibilities as men in the society.

Z I could see it as a second core value for UKUMBI and your work, education and women along with the architectural approach of understanding how people use space in their own cultures. Is there any other core value that you could think of that makes UKUMBI what it is?

S The quality of architecture is important, the quality of the environment for everyone. I think it is kind of human right. Design ought to be for everyone, regardless of your social or economic status. The less you can pay for it the more you actually need it. It has effects on equality and so many issues in the society if the environment is being taken care of, is being cared for. It becomes safer. Poverty has so many different aspects to it, and if you, as a designer are able to affect that, are able to create a better environment, it's likely to have a snowball effect and it will facilitate other things, it will invite other good things to the lives of these people. You need other disciplines also to create these economical and social possibilities.

Z The communities you have worked with were facing some challenges, what could be an example of such a challenge or need?

S The project for the shelter house in Moshi, the challenge was the domestic violence that these people were facing, and the NGO was working with them to help them in this difficult situation. In Cairo, the lack of facilities and education of the Zabbaleen, that this NGO was trying to provide them with and help them to improve their living conditions. In Senegal the women who were organising themselves in groups to help each other in difficult day to day situation. For example these women in Senegal, before the women's centre, where would they meet? They would meet in each other's houses. The problem is that they grew many

and the houses were too small. It was a very concrete and physical problem.

Z That needed a very concrete solution. I am working on a sanitation project that has a multidisciplinary approach at its base. My discipline (architecture) is as important as other disciplines or even sometimes in the background. I see it as my language; I use it to work in the context of the project. How would you see architecture's role in a multidisciplinary project?

S For me it is the core discipline. If you give up emphasising the importance of the quality of the environment then you give up many other things as well, it's easy for other disciplines to come in if the design and the environment are being persistently valued and given such emphasis. The importance is there if you create it. If a space provides them with the possibilities to do what they need to, or the things that would benefit their society. Its easier for other disciplines to enter.

Z Architecture as a catalyst, facilitator?

S It's a basic need. Birds build.

5. EVALUATION FORM FOR THE “PILOT” TOILET

Tanzania federation of urban poor
Centre for community initiatives Tanzania
Global dry toilet association of Finland

MONITORING AND EVALUATION FORM #6

To be asked by CCI to “Pilot” toilet beneficiaries

Instructions:

- -The numbers assigned to some of the questions refer to the indicators for reporting “Project outputs” and “Project objectives” to the Ministry of Foreign affairs of Finland found in the Project Application form or in the document: “objectives.pdf” and “outputs.pdf”
- -The questions should be asked to at least **4 users: one leader, at least one participant to the construction, 1 woman and any other.**
- -One form per person interviewed.

1. Name of beneficiary

- Husna Shechonge(PHAST ujenzi leader (F),
- Carolina Tawala (F)- beneficiary
- John Victor Haule (M)- CTN, Beneficiary + participated in construction)
- Farida Kibwana

2. What have you benefited with? Two of the beneficiaries have been benefited with a toilet (John Victor and Carolina Tawala) while two have been benefited with skills on the construction (Husna and Farida)

3. Sex, Three women were interviewed and one man.

4. Name of Federation group: Two interviewee are federation members who are Husna Shechonge from Tumaini letu group and Farida Kibwana from Tumaini letu as well.

5. Settlement: Keko machungwa

6. Municipality: Temeke

7. Region: Dar es salaam

8. Type of construction/improvement: Eco-San

9. a. When was the facility built:

According to beneficiaries responds, the facility was constructed in June, 2014 that's when the construction started.

b. When did you start using the facility? September, 2014 is when they beneficiaries started using the toilet when it was inaugurated as a first pilot toilet.

10. Number of households using the facility: Despite that this interview targeted the pilot project, but there were additional question particularly regarding this question on household's users: One was number of households for a pilot project which was reported as 3 households and for the current new nine (9) constructed toilets the households are 29. This was given by Husna who is a Phast ujenzi leader.

11. Number of people using the facility: The Number of users reported was 9 (2Female and 7Male) for a pilot project. These are permanent users who are more likely to use the toilet every day.

However due to youth Centre managed by CTN having different youth coming to visit, there are also regular users whom was not able to have the specific number, but according to CTN'S estimates they are a maximum of 12 people per day. These include passerby, CTN's visitor and sometime neighbors. For the other newly constructed toilets, the number of people is 112.

12. Detailed of users of facility

The tables below shows the users at the pilot toilet as well as the users of toilet for the current contracted toilets (to date)

Pilot project:

Adult female	Adult male	Total	Children under 18		Total	Adult disable people		Under 18 disabled	
2	7	9	Female	Male		Female	Male	Female	Male
			-	-	-	-	-	-	-

Current 9 constructed toilets

Adult female	Adult male	Total	Children under 18		Total	Adult disable people		Under 18 disabled	
44	41	85	Female	Male		Female	Male	Female	Male
			19	8	27	-	-	-	-

13. How much did the toilet cost:

- **Price paid:** The price of toilet is not known by pilot project beneficiaries, however according to Phast Ujenzi leader Husna Shechonge, the estimated cost is 4,600, 000/=Tshs

(b) **Own Contribution:** The beneficiaries were able to contribute their labour power, collecting plastic bottles, and sand.

14. Financial Viability

- How affordable do you think this toilet is in comparison to other toilets on the market?
1: Non affordable, 2: Average, 3: Very affordable

1: Non affordable	2	3
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The beneficiaries together with Phast ujenzi responded that the toilet is not affordable due to the material used such as timbers particularly for pilot project and plastic bottles which have to be collected from different places and filled in with the sand which is a lot of work and people have to be paid for doing this. This adds the cost in terms of the time

spent on collection of bottles. The interviewee added that the high cost of toilets not only the pilot but also the ongoing has made some beneficiaries to raise their concern on how come the toilets are expensive for many to afford. However they is a great appreciation on the quality of the toilet and how good they look compared to other existing traditional toilet, the improvements made is highly appreciated.

13. Community, municipality and children recognize dry sanitation as an effective, attractive and viable system (7.1.4)

- What is your opinion on dry sanitation (7.2.11)?
There is great recognition and appreciation of dry sanitation in term of being permanent in usage hence people will no more facing the challenges of digging pits latrines when they become full, no more regular emptying. For example before the pilot project, there was the emptying of toilet after at least 7 months where they had to dig a pit for shifting the sludge which was also not health because it was locally done with no proper protective equipments.
- Do you have any knowledge of any dry toilets built outside of the project (as a result of publicity, word of mouth...)? (7.2.12). No any information yet about this.

14. Acceptability & satisfaction

- How satisfied are you with the facility built? 1: not satisfied, 2: average, 3: very satisfied

1	2	3: Very satisfied
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- What are you most satisfied with?
 - i. Interface design
 - ii. Exterior and interior esthetic aspect of toilet:
 - iii. Materials used: particularly the use of interlocking bricks and plastic bottles which is something different and it has good appearance.
 - iv. Accessibility
 - v. Any other...
- What are you least satisfied with?
 - i. Interface design
 - ii. Exterior esthetic aspect of toilet
 - iii. Materials used: Despite that the material used are attractive with good appealing, there is some challenges in some of these materials for example on the pilot toilet,
 - the stares are made of timber which are not durable in terms of usage, the current stares have loosen and the black painting made have erased which makes it more easily to decay particularly during rainy season. The recommended materials are to use the concretes made of block cements or plastic bottles.

- The use of palm leaves as a separator for two parts of the toilet inside the pilot toilet are not permanent because the one used are getting wet by the water from the shower and they have started to decay and worn by ants. (*look at the photos attached*)

iv. Accessibility

- **What has been the improvement compared to the previous facility?**
 - No more regular emptying of toilets after 7 months as it was from the previous toilet. The previous toilet was getting full not only because it is shared by 3 but also the issue of high water table on the area was a challenge as well.
 - Privacy has very much been improved compared from the previous toilet which did not offer privacy.
 - No more smell and the toilet is very clean compared to the previous which was very smelly.
 - There is more comfort in using the toilet compared to the previous one which offered little comfortability due to the conditions of the previous toilet identified above and because the toilet was not roofed during rain season it was challenging to use it.
 - The disease such as UTI which was very common particularly for females has improved. No more suffering of UTI.
 - The installation of annual cleansing is something of importance particularly in coastal areas where this facility is critical. The few eco-san toilet particularly construction by federation previously had no this facility which made some people to be hesitant to have such kind of toilet. The dry toilet project has improved this and increased the possibility of acceptance.
- **Could you suggest any improvement?**
 - To install/ use another material as a separator inside the toilet rather than using the palm leaves which will not last long as well as the stairs (*refer Qn.14, point C, Section iii above*)
 - To expand a little bit the annual cleansing chamber to allow the comfortability of using it when washing but also to avoid the water getting into the faeca hole.
- **How satisfied are you with the quality of the construction?**
 - The interviewees were very much satisfied with the quality of construction, however they requested when the construction starts, it should go quickly.
- **Have you had anyone from outside the project interested in your toilet?**
 - i. If yes, how many?
 - There are so many people who are coming to visit the area and showing the interest from the settlement itself, neighboring settlement even outside the region. In particularly CTN had 40 visitors from scout in

Morogoro region that saw the toilet in Television and came to visit and look on the possibility if they can construct the same in Morogoro. They were impressed with the toilet and promised to go and discuss it, if there is a possibility of constructing it they will let CTN know. The estimation made is about 200 visitors who have shown interest of having the same kind of toilet though some have complained on the high cost of construction that they would like to have it but it is expensive for them to afford.

- It was noted that there is no visitors book particularly for pilot project which seem to attract many. The beneficiary – CTN was advice if they can have that to know what kind of people are visiting the toilet and from where. During the interview, some youth people came to see the toilet while the interview was going on (*see the attached photo below*)

ii. And for what reasons?

What they are interested more is the material used eg. The use of plastic bottles and the dry toilet which for many it is a new technology they are not familiar with.

15. Urine and Compost

- How many urine containers are filled per week?
The urine is filled at least after 2- 3weeks.i.e one container after 3weeks
- **Which dry material are you using for the faecal hole?**
Currently they are using ashes though they have been instructed to use the sawdust, they haven't started using it because they have to buy it in some cases. It was noted that most of people cooking chips they are using it, hence getting it for free it is possible but not with assurance of getting it free for all times.
- i. **Is it readily available?**
The ashes is more easily available from beneficiary themselves, even neighbors who knows that they are using ashes they are able even sometime to carry and bring it for them to use in the toilet. For sawdust they are available but not easily as it is for ashes. The distance from the pilot project to where they are available is 10-15 minutes but in some cases it might include costs of buying them. For the current known cost of sawdust it is cost k, 20kgs the cost is 10,000Tshs.
- **Have you been testing the urine on plants?**
 - i. **When?** Yes it was tested on Banana plant
 - ii. **Where?** At CTN's resident, just behind the pilot project.
 - iii. **And what were the results?:** The results were beyond expectation because for the last two years since it was planted, there has been no banana fruits, after using the urine the plant has been able to bear 3 times. They are now waiting to enjoy the third banana fruit which is big (*see the attached photo*)

16. Construction

- Were you involved in the construction of the toilet? **YES**
 - i. **If yes would you say your involvement in the construction helped you understand the technology better?**
 - At least all interviewee were involved in the construction, despite of a lady living in CTN's house (Carolina Talawa) whom she was not directly involved except her husband. The involvement has real helped the understanding of the technology from the way it is constructed, some measurements, usage and little understanding on the composting.
- **How long did the construction last for?**
About 3months (Pilot project)
- **How many days did you participate in the construction?**
For the whole time of construction.
- **Were there anything/parts added to the toilet after completion?**
No
- **During construction**
 - i. Did you learn about something in particular?
Arrangement of bottles, measurements, construction work, the need to consider the measurement and quality of the work and a little knowledge on composting.
 - ii. What could have been done better?
-Speeding up of the construction process
-Providing some construction equipment particularly the stares. A lot of equipments have been provided except the stares which are highly needed.
 - iii. Did you teach something to someone?
All interviewees have an opportunity of teaching other people about the toilet. This is on the construction work particularly the first Phast ujenzi technician who has been able to teach fellow technicians particularly the new ones who have joined the team. Other people coming to see the toilet both pilot and others ongoing toilets, had the opportunity to be taught on how the toilet works.

17. Use

- **Have you received enough training on**
 - i. **Compost use:** There is little knowledge on composting among beneficiary and Phast ujenzi. Since the pilot project is about to getting full for the first chamber, this could be an opportunity to learn practically.
 - ii. **Urine use:** There is knowledge particularly for CTN who has been able to test the urine and see the results. For the other PHAST team members and beneficiary still there is a need of more knowledge on this as well.
 - iii. **Eco-san toilet use:** It was noted that there is a wide knowledge on the usage of the toilet among Phast ujenzi and beneficiaries particularly on using it properly to

make sure there is no any contamination between faecal and any liquid whether from the shower or urine.

- iv. **Eco-san toilet maintenance and cleaning:** The toilet is clean and well maintained. Since it was constructed there has been nothing replaced/ repaired. They are using a brush and antiseptic soap according to the beneficiary to make sure that the health is guaranteed.

What knowledge are you lacking?

- Compositing
- Urine use particularly on the measurement of water and urine before applying it on plants.
- There is little knowledge on the usage of sawdust and ashes. The beneficiary have been told to use the sawdust but they would like to know/ to have more information on advantage and disadvantages of using both these materials.

Is there anything that does not function? Non

Is the toilet easy to use?

- It is easy to use, even for children who have been taught on the usage and there has been no challenge so far.

What could be improved to make the use easier?

- To expand a little bit the annual cleansing chamber so that it could be wider to not allowing water to get into the faecal hole.
- Not using the palm leaves which seem not sustainable. Other materials such as concrete wall/ plastic sheet as installed toilet's wall inside can be used as well.
- The faecal hole to be lifted up a bit so that they can look for something to cover up particularly when showering to avoid the water getting inside. Currently they are covering up with a bucket but still around it you can see there is a space which allow water. Hence a person has to shower attentively to avoid water getting inside.
- The slope to the shower hole isn't allowing fast flow of water when bathing. Hence it has to take time for a person to push the water after showering.
- **Are there any barriers that you or other household members are faced with when accessing/using the toilet?** There is no barriers to the extent that they are not able to use the toilet/ difficult to use it but there are some areas which needs to be improved as mentioned above (*Refer the question above*)
- **For women/girls: Are you facing any challenges while using the toilet during your menstruations?** For the interviewed women they all feel that if there could be a facility/ service inside the toilet to handle menstrual pad. The previous toilets (pit latrines) were allowing them to drop into the toilet, but for this they feel that they have to look for another alternative. One of it is burning the pads with solid waste, but you it is somehow

difficult to burn the pads every day, so they have to keep them inside and after some days they can burn it. They recommended if there could be a container or any design of the toilet which could also allow that service to be done within the facility.

- About children: Are children facing any challenges when using the toilet? There has been no any reported challenge on the use of toilet by children. They well understand how to use it after being instructed.
 - i. If yes which?

18. Maintenance

- How many repairs have taken place? Non
- How do you clean the toilet? With water, antiseptic soap and a brush
- How often do you clean the toilet? Twice a week,

19. Additional feedback

- Is there anything you wish to add to help us improve the design of the future toilets?
Using the timbers for construction of walls is very expensive, other materials explored such as interlocking bricks is a good thing and more affordable options should be explored. One of it could be the use of plastic sheets as it was used inside the toilet can be used for walling and putting up the bottled eg. How the pilot toilet's door are. This will reduce the cost of walling but also it will be another innovation of not using the plastic bottles on the concrete only but on walls as well, but also this will depend on the available regulations if they allow it but it can be tested as well.



Figure 1: *Wet palm leaves inside the toilet*



Figure 2: *Decaying palm leaves by ants*



Figure 3: *Visitors getting explanation from CTN about the toilet*



Figure 4: CTN looking at the Banana fruits as
result of using urine



Figure 5: Wood stares

